T. J. JONES.

AUTOMATIC TENSION CONTROLLING MECHANISM.

APPLICATION FILED FEB. 26, 1920.

1,395,830.

Patented Nov. 1, 1921.

2 SHEETS—SHEET 1.

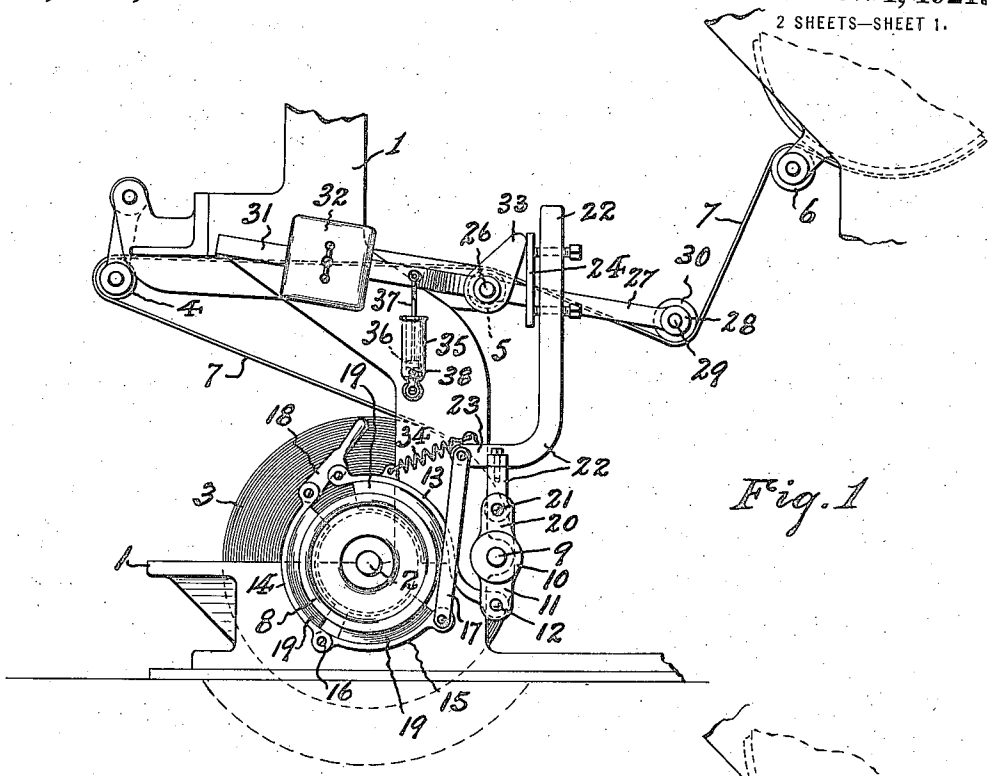


Fig. 1

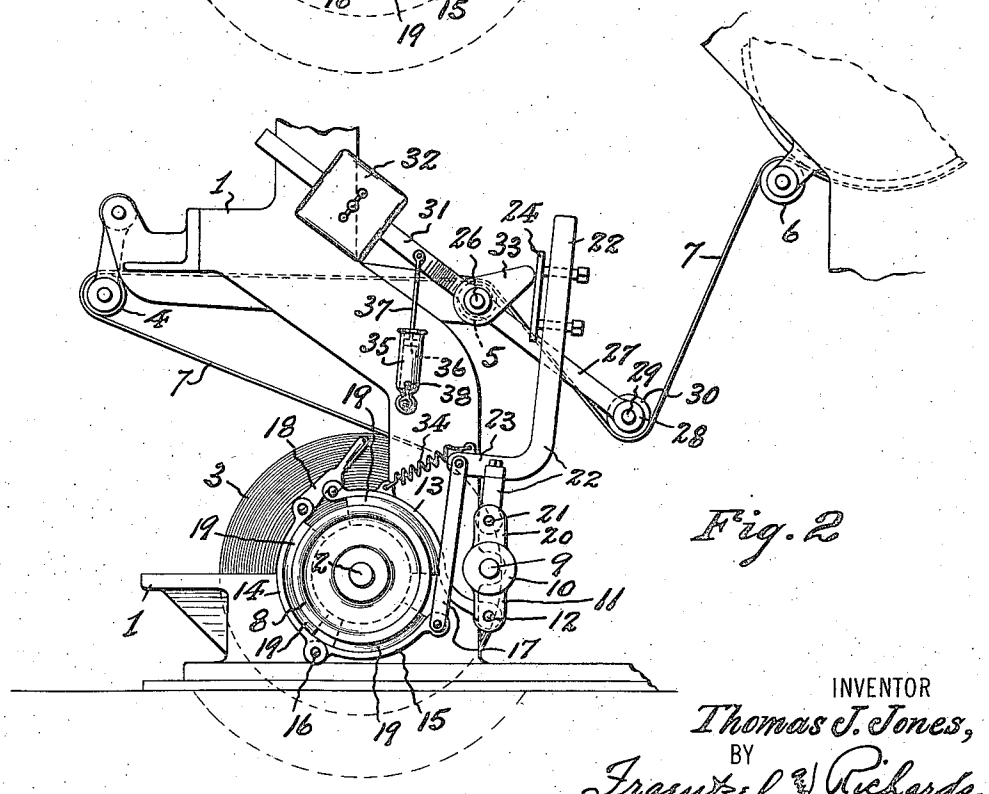


Fig. 2

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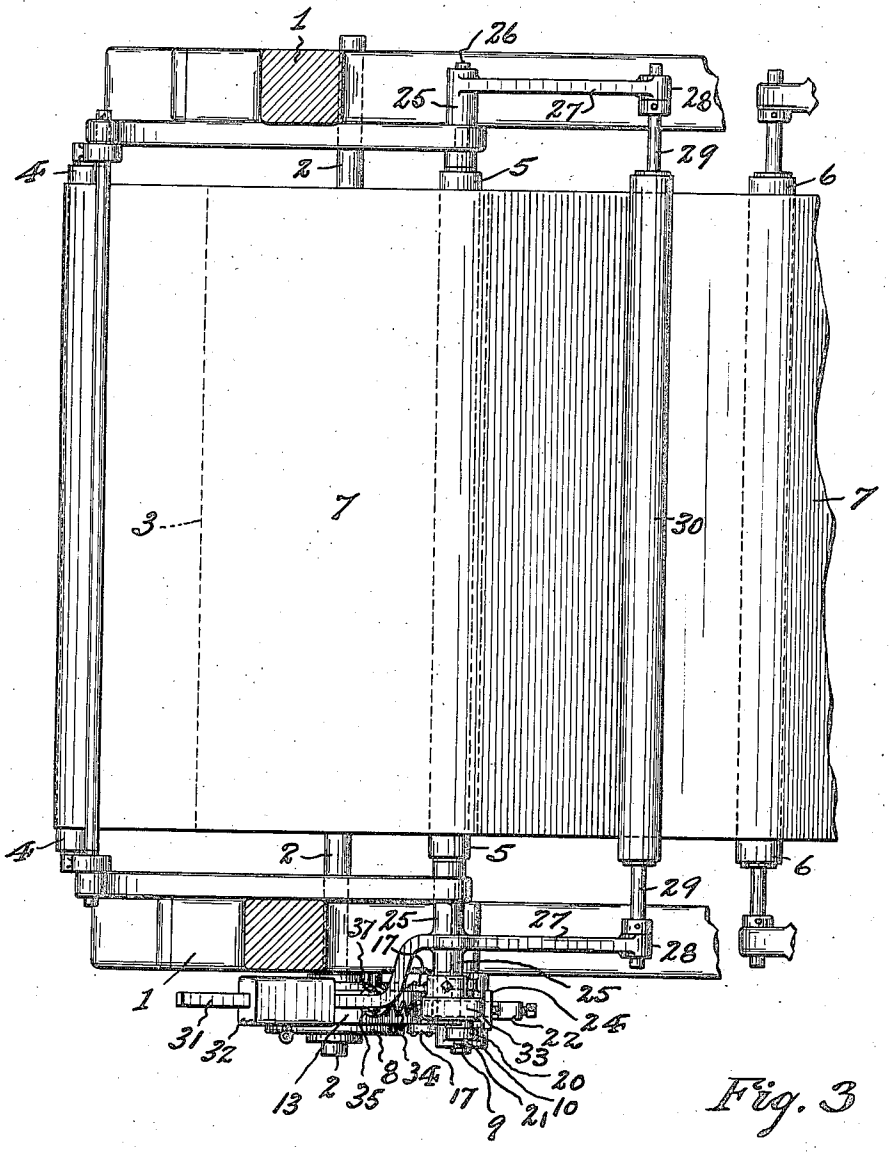


Fig. 3

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UNITED STATES PATENT OFFICE.

THOMAS J. JONES, OF JERSEY CITY, NEW JERSEY.

AUTOMATIC TENSION-CONTROLLING MECHANISM.

1,395,830. Specification of Letters Patent. Patented Nov. 1, 1921.

Application filed February 26, 1920. Serial No. 361,424.

To all whom it may concern:

Be it known that I, THOMAS J. JONES, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Automatic Tension-Controlling Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention relates, generally, to automatic tension controlling mechanism; and, the invention has reference, more particularly, to automatic tension controlling means for printing presses, looms and all other machines operating with sheet or web material to be wound or unwound under a fixed tension.

The invention has for its principal object to automatically control the feeding of sheet or web material from or to a roll, so that the tension of the material at a desired point beyond the roll may be automatically maintained at a desired predetermined or fixed degree, and whereby injury to the web or sheet of material and delays in the working of the machine operating with such material may be avoided.

Other objects of the present invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

With the various objects of the present invention in view, the same consists, primarily, in the novel construction of automatic web tension controlling means hereinafter set forth; and the invention consists, furthermore, in the novel arrangements and combinations of the various devices and parts, as well as in the details of the construction of the same, all of which will be hereinafter more fully described, and then finally embodied in the claims appended hereto.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a side elevation of the novel automatic web tension controlling means, made according to and embodying the principles of the present invention; Fig. 2 is a similar side elevation of the same illustrating the operation thereof; and Fig. 3 is a detail plan view of the same.

Similar characters of reference are employed in all of the hereinabove described views, to indicate corresponding parts.

Referring now to said drawings, I have illustrated therein my invention as applied to web cylinder printing presses, such as are usually employed in the printing of newspapers, although I wish it understood that the principles of my invention are capable of use in many other classes of machinery wherein it is desired to wind off or on rolls a web or sheet of material under tension or control. In the drawings the reference-character 1 indicates the frame-work of the press where the roll of newsprint paper is mounted, so that the web of paper may feed from the roll to the printing point or cylinders of the press and beyond. Said frame-work 1 is provided with a properly located detachable spindle 2, journaled in connection therewith for free rotation, and upon which is fixed or keyed the roll of newsprint paper 3 from which is fed, over suitably disposed idler rollers 4, 5 and 6 mounted in connection with the frame-work 1, the running web 7, which travels through the printing mechanism and thence on through the press, all in a manner well understood by those skilled in the art. Fixed on one end of said spindle 2 is a brake wheel 8. Secured upon a stud 9, connected with and projecting from the side of said frame-work 1, is a bracket member 10 having downwardly projecting ears 11 to support a pivot pin 12 upon which is pivotally mounted one end of a brake band device. Said brake band device comprises, preferably, a plurality of brake band sections 13, 14 and 15. The brake band section 13 is pivoted at one end upon said pivot pin 12, and thence extends upwardly over said brake wheel. The brake band sections 14 and 15 are hinged together at their adjoining ends by a hinge connection 16, the free end of said section 15 being pivotally connected with draw-links 17, the purpose and operation of which will subsequently be more fully disclosed. The adjoining ends of said sections 13 and 14 are normally connected together by a suitable coupling device 18 operatable to disconnect the said sections 13 and 14 so that

the brake band device may be opened up at will when mounting or dismounting a spindle 2 and its brake wheel 8 from the press. Each section 13, 14 and 15 is provided with a brake shoe 19, fixed to the under side thereof, and engageable operatively with said brake wheel 8. Said bracket member 10 is also provided with a pair of upwardly projecting ears 20 to support a pivot pin 21 upon which is fulcrumed a bell-crank lever 22, to the lower forwardly projecting arm 23 of which are pivotally connected the upper ends of said draw-links 17. Adjustably related to said bell-crank lever 22, adjacent to its upper free end, is a face-plate 24. Pivotally connected with the frame-work 1 at each side of the press, preferably by journaling the hubs 25 thereof upon the outwardly projecting ends of the spindle 26 upon which the idler roller 5 is mounted, are rearwardly extending compensator arms 27 provided at their free ends with bearing portions 28. Journaled in said bearing portions 28, so as to extend between the free ends of said arms 27, is a spindle 29 upon which is mounted a compensator roll 30, which engages said running web 7 at a point intermediate said idler rollers 5 and 6. One of said compensator arms 27 is provided with an oppositely or forwardly extending lever arm 31, preferably integrally connected therewith. Adjustably mounted and movable upon said lever arm 31 is a weight 32 adapted to counter-balance, to the desired degree the weight of said compensator roll 30 upon the running web 7, whereby the degree of tension under which the said web is to run may be predetermined. Fixed on the hub 25 of that compensator arm 27, which is located at the side of the press where the above described brake mechanism is situated, is a cam-member 33 adapted to move simultaneously with the movement of said compensator arms and compensator roll. Said cam-member 33 is situated so as to operatively engage the face-plate 24 of said bell-crank lever 22, and by its moving pressure thereon being adapted to control the operative movements of said bell-crank lever, and through the latter said brake mechanism.

The device operates as follows:—The running web 7, by the operation of the press, is drawn from the roll of paper 3, causing the latter to revolve, and by its movement to rotate the spindle 2 and its brake wheel 8. It is desirable in thus pulling the web 7 from the roll of paper 3 that the movement of the web be so maintained and controlled that the tension thereof at the printing point remains constant at all speeds, and to this end the weight 32 is adjusted upon the lever arm 31 so as to counter-balance the weight of the compensator roll 30 as it bears upon the web, thus fixing the degree of tension under which the web 7 runs. When the compensator roll 30 is thus counter-balanced to the degree desired, the normal position of the same is established, and also the normal position of the cam-member 33 is likewise determined, so that the bell-crank-lever 22 may be properly adjusted to the cam-member 33 by advancing or withdrawing the face-plate 24 to so contact with the cam-member when in such normal position that the bell-crank lever is also normally established in brake releasing position. Now as the web runs forward through the press, if the momentum of the roll of paper 3 gains headway sufficient to reel off the web faster than the press will take up the same under the desired tension, the tendency will be to slacken the web as it passes beneath the compensator roll 30, whereupon the latter bears down upon web with a downward swinging movement of the compensator arms 27 (as shown in Fig. 2), thus immediately taking up the slack of the web 7, and through the action of the cam-member 33 upon the bell-crank lever 22 operating the brake-mechanism to check the momentum of the roll of paper 3, thus at once checking any loss of tension, or, in other words, automatically maintaining the tension to the desired degree. The rotation of the cam-member 33 causes the bell-crank lever 22 to swing rearwardly from its pivotal connection 21, thus producing an upward swinging movement of its arm 23, which in turn pulls upwardly said draw-links 17, thereby tightening the brake-band devices to thrust the shoes 19 into frictional binding or braking relation to the brake-wheel 8, consequently resisting the rotation of the spindle 2 and slowing down the roll of paper 3. As the roll of paper slows down, the taking up of the running web 7 by the press will tend to return or lift the compensator roll 30 to normal initial position, thereby swinging upward the compensator arms 27 and reversing the rotation of the cam-member 33, so that the pressure of the latter upon the bell-crank lever 22 is released to permit the return thereof to normal initial position whereby the brake-mechanism is released and the spindle 2 with the roll of paper 3 is again free to rotate and feed off the web at proper speed and tension. In order to assist the return of the bell-crank lever 22 to normal position and at the same time aid in releasing the brake band mechanism, a spring means 34 is interconnected between the arm 23 of the bell-crank lever 22 and the free end of the brake-band section 13. In order to prevent a too rapid upward swinging movement of the compensator arms 27 with the

compensator roll 30, whereby a vibratory oscillation of such elements would be produced detrimental to the maintenance of the steady tension of the web which is desired, there is provided a pneumatic check mechanism comprising a cylinder 35 pivoted by its lower end to the side of said frame-work 1, in which reciprocates a plunger 36 interconnected by the plunger rod 37 with the lever arm 31. Said pneumatic check mechanism is designed to yield readily to an upward swing of said lever arm 31 (which is coincident with the downward swing of said compensator arms 27), but by compression of the air in the cylinder by a downward stroke of the plunger under impulsion of the downward swinging movement of the said lever arm 31 (which is coincident with the upward swing of said compensator arms 27), tends to check a too rapid movement of the latter, thus making for a steadily controlled return of the compensator roll to normal initial position. The cylinder 35 will be provided with a vent 38 permitting the comparatively slow discharge of the air compressed therein by the said downward movement of the plunger therein. Of course, other means for checking or steadying the return movements of the compensator devices may be employed within the intended scope of my invention.

It will be understood from the above description of my invention that I have devised a very simple yet efficient mechanism for controlling the reeling off of a running web, and one which may be employed in printing presses with advantage, and the principles of which may be also advantageous in controlling a web tension either in unreeling or reeling up operations of the same required by other types of machines generally used for other purposes.

When applied to printing presses my invention has the advantage of acting immediately on the brake mechanism controlling the roll of paper 3 when necessity requires the sudden stopping of the press, thereby preventing the roll from turning without danger of breaking, wrinkling or otherwise disarranging the running web 7, and thus automatically preventing one of the most frequent causes of delay, and also preventing great waste of paper.

I am aware that some changes may be made in the various arrangements and combinations of the several devices and parts, as well as in the details of the construction of the same, without departing from the scope of my present invention as set forth in the foregoing specification and as defined in the appended claims. Hence, I do not limit my invention to the exact arrangements and combinations of the various devices and parts as described in said specification, nor do I confine myself to the axact details of the construction of said parts as illustrated in the accompanying drawings.

I claim:—

1. In a device of the kind described, a rotatable web roll supporting spindle having a brake wheel, pivoted compensator arms, a compensator roll journaled at the free ends of said compensator arms to extend therebetween, said compensator roll operating by gravity to engage the running web extending from said web roll, one of said compensator arms having an oppositely extending lever portion, a counter balancing weight adjustable on said lever portion for regulating the weight or pressure of said compensator roll on the running web to determine the desired normal tension of the latter, a cam member adapted to be rotated by the oscillation of said compensator arms, a brake mechanism coöperating with said brake wheel, and means for operating said brake mechanism automatically controlled by said cam-member, whereby racing of the running web tending to relax the desired normal tension of the same brakes and checks the feeding movement of the web roll.

2. In a device of the kind described, a rotatable web roll supporting spindle having a brake wheel, pivoted compensator arms, a compensator roll journaled at the free ends of said compensator arms to extend therebetween, said compensator roll operating by gravity to engage the running web extending from said web roll, one of said compensator arms having an oppositely extending lever portion, a counter-balancing weight adjustable on said lever portion for regulating the weight or pressure of said compensator roll on the running web to determine the desired normal tension of the latter, a cam-member adapted to be rotated by the oscillation of said compensator arms, a brake mechanism coöperating with said brake wheel, and a lever mechanism for actuating said brake mechanism, the operative movements of said lever mechanism being automatically controlled by said cam-member, whereby racing of the running web tending to relax the desired normal tension of the same brakes and checks the feeding movement of the web roll.

3. In a device of the kind described, a rotatable web roll supporting spindle having a brake wheel, pivoted compensator arms, a compensator roll journaled at the free ends of said compensator arms to extend therebetween, said compensator roll engaging the running web extending from said web roll, one of said compensator arms having an oppositely extending lever portion, a counterbalancing weight adjustable on said lever portion, a cam-member adapted to be rotated by the oscillation of said compensator arms,

a brake mechanism coöperating with said brake wheel, a lever mechanism for actuating said brake mechanism, the operative movements of said lever mechanism being automatically controlled by said cam-member, and means for adjusting said lever mechanism to the initial position of said cam-member.

4. In a device of the kind described, a rotatable web roll supporting spindle having a brake wheel, pivoted compensator arms, a compensator roll journaled at the free ends of said compensator arms to extend therebetween, said compensator roll engaging the running web extending from said web roll, one of said compensator arms having an oppositely extending lever portion, a counter balancing weight adjustable on said lever portion, a cam-member adapted to be rotated by the oscillation of said compensator arms, a brake mechanism coöperating with said brake wheel, a lever mechanism for actuating said brake mechanism, the operative movements of said lever mechanism being automatically controlled by said cam-member, means for adjusting said lever mechanism to the initial position of said cam-member, and means for checking violent and unsteady movement of said compensator arms when returning to normal initial position after operation thereof.

5. In a device of the kind described, a rotatable web roll supporting spindle having a brake wheel, pivoted compensator arms, a compensator roll journaled at the free ends of said compensator arms to extend therebetween, said compensator roll engaging the running web extending from said web roll, one of said compensator arms having an oppositely extending lever portion, a counterbalancing weight adjustable on said lever portion, a brake mechanism coöperating with said brake wheel, means automatically actuated by the oscillation of said compensator arms for operating said brake mechanism, and means for checking violent and unsteady movement of said compensator arms when returning to normal initial position after operation thereof.

6. In a device of the kind described, a rotatable web roll supporting spindle having a brake wheel, a pivoted oscillatable tension compensator mechanism in engagement with the running web extending from the web roll, a brake mechanism coöperating with said brake wheel, means operated by the movement of said compensator mechanism for automatically actuating said brake-mechanism, and means for checking violent and unsteady movement of said compensator mechanism when returning to normal initial position after operation.

7. In a device of the kind described, a rotatable web roll supporting spindle having a brake wheel, a pivoted oscillatable tension compensator mechanism under which the running web extending from said web roll is engaged, a cam-member operated by the movement of said compensator mechanism, a brake mechanism coöperating with said brake wheel, means for operating said brake-mechanism automatically controlled by said cam-member, and means for checking violent and unsteady movement of said compensator mechanism when returning to normal initial position after operation.

8. In a device of the kind described, a rotatable web roll supporting spindle having a brake wheel, a pivoted oscillatable tension compensator mechanism in engagement with the running web extending from the web roll, an adjustable means for counter-balancing said compensator mechanism, a brake mechanism coöperating with said brake wheel, means operated by the movement of said compensator mechanism for automatically actuating said brake-mechanism, and means for checking violent and unsteady movement of said compensator mechanism when returning to normal initial position after operation.

9. In a device of the kind described, a rotatable web roll supporting spindle having a brake wheel, a pivoted oscillatable tension compensator mechanism under which the running web extending from the web roll is engaged, a cam-member operated by the movement of said compensator mechanism, a brake mechanism coöperating with said brake wheel, a lever mechanism for actuating said brake mechanism, the operative movements of said lever mechanism being automatically controlled by said cam-member, and means for checking violent and unsteady movement of said compensator mechanism when returning to normal initial position after operation.

In testimony that I claim the invention set forth above I have hereunto set my hand this 3rd day of February, 1920.

THOMAS J. JONES.

Witnesses:
GEORGE D. RICHARDS,
BARBARA W. SUTTERLIN.