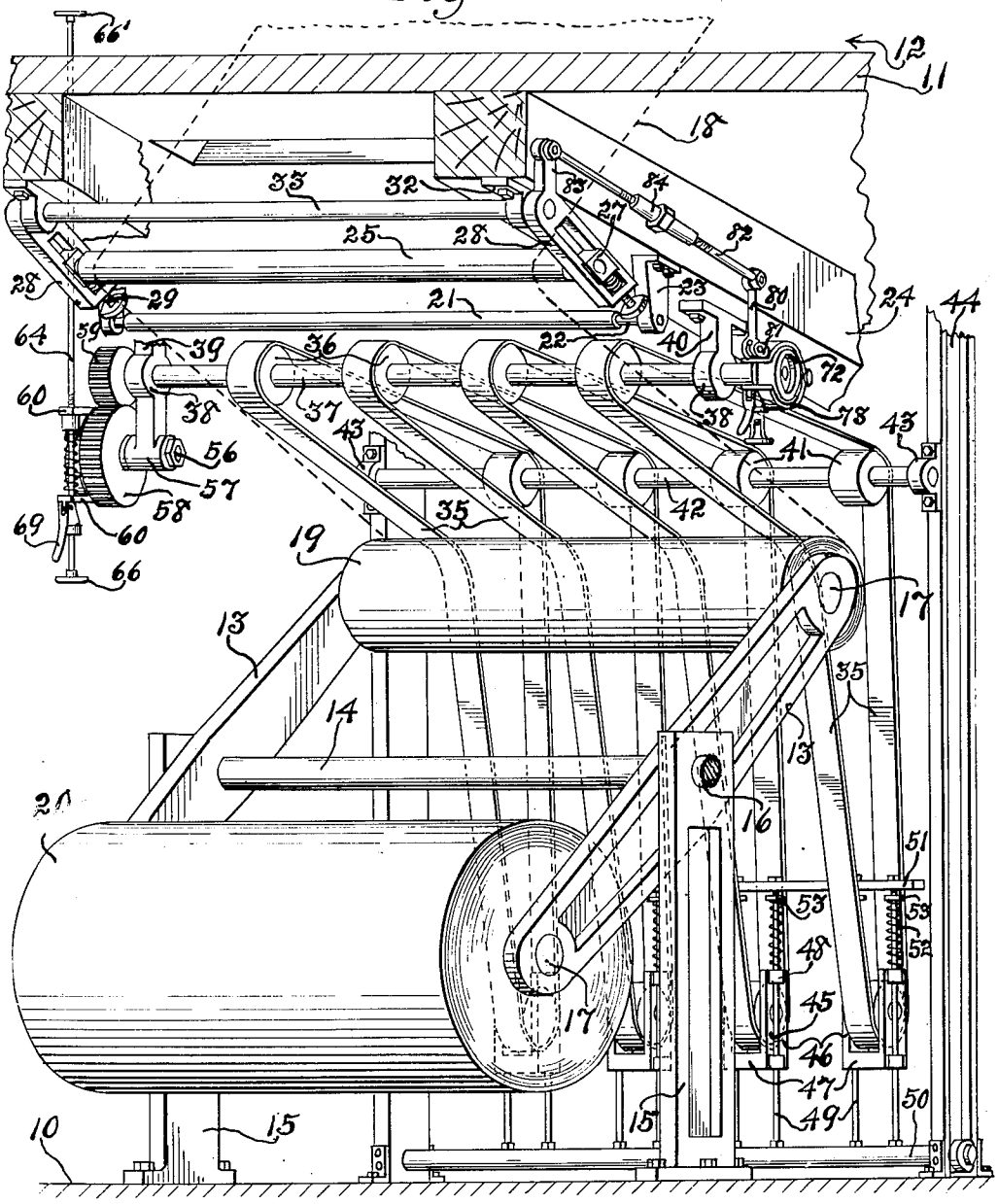
Sept. 11, 1934. A. W. BROMS 1,972,916

TENSION CONTROL DEVICE

Filed April 22, 1933 3 Sheets-Sheet 1

Fig. 1




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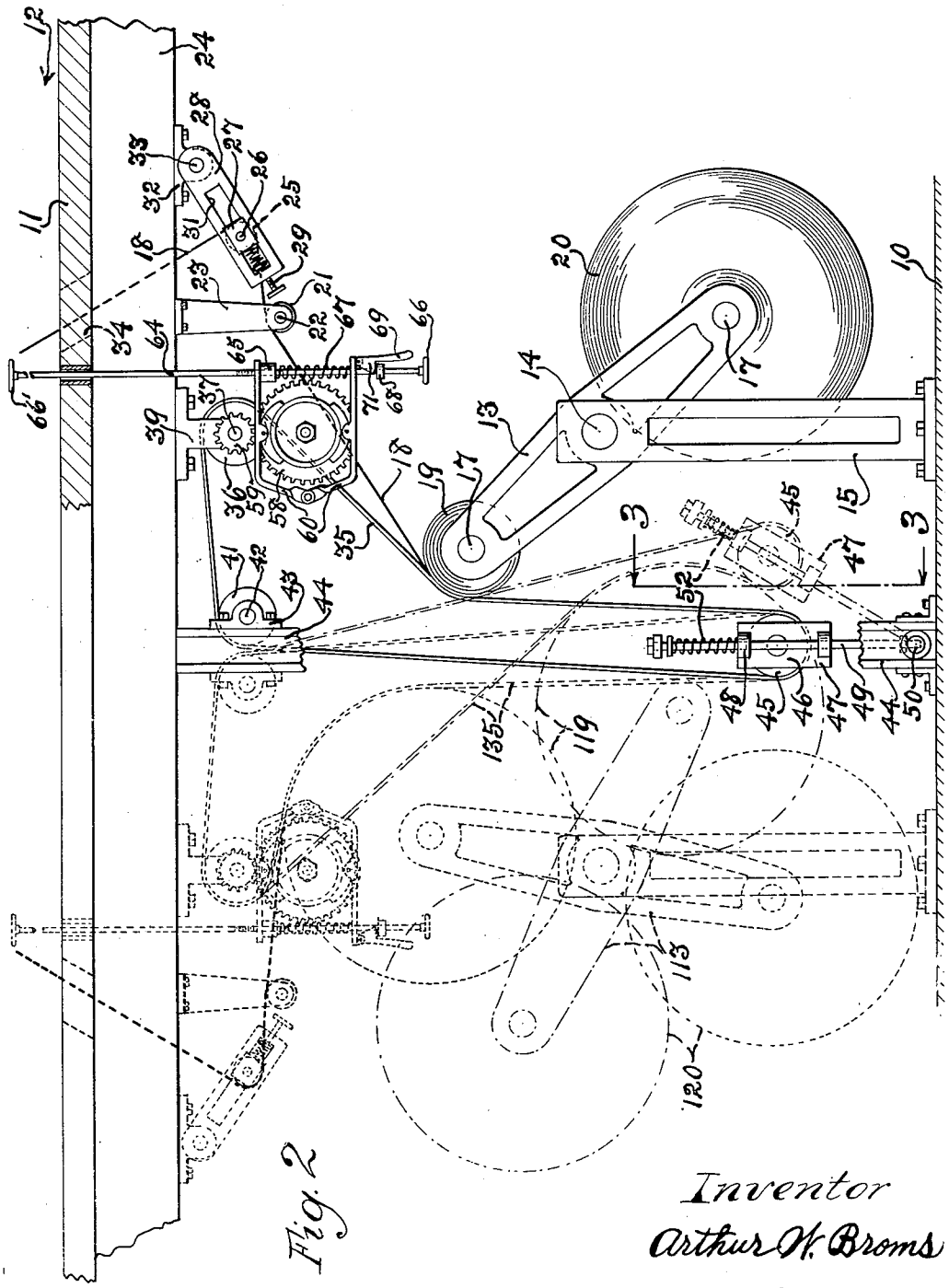


Fig. 2

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Fig. 3

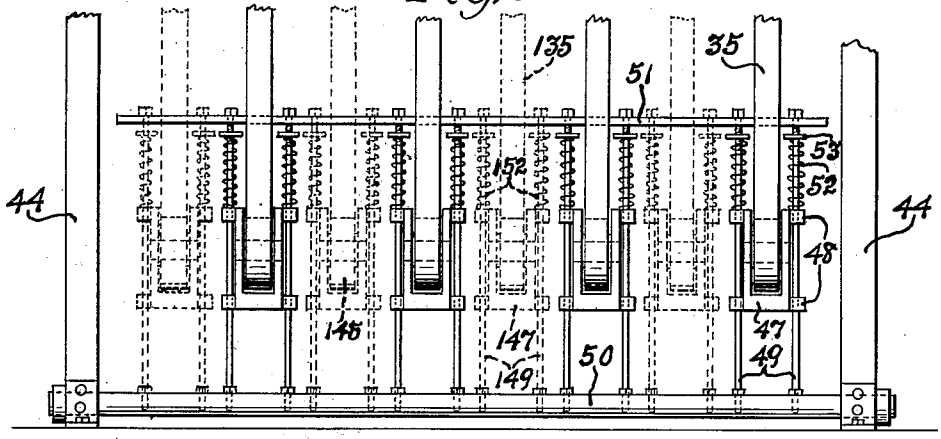



Fig. 5

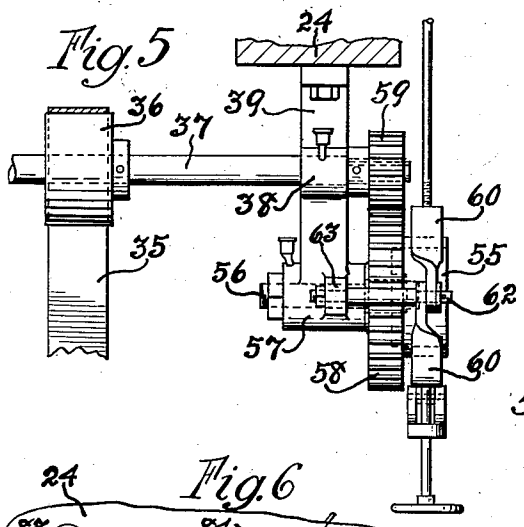



Fig. 4

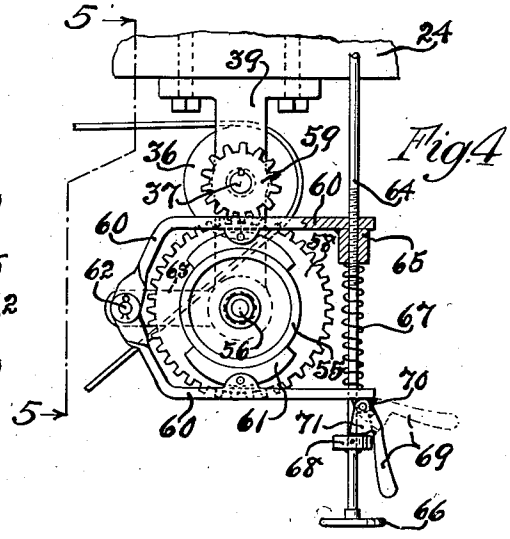
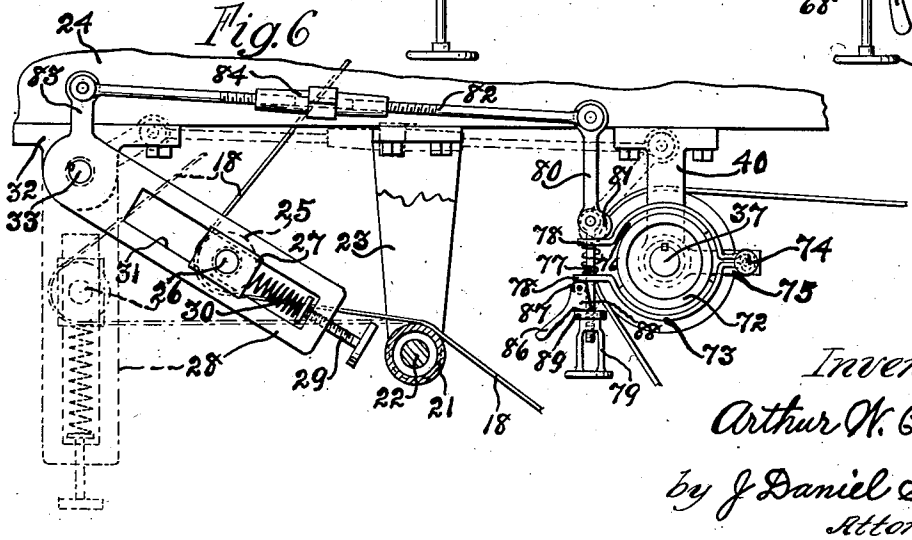



Fig. 6




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# UNITED STATES PATENT OFFICE

1,972,916

## TENSION CONTROL DEVICE

Arthur W. Broms, Chicago, Ill.

Application April 22, 1933, Serial No. 667,456

13 Claims. (Cl. 242—75)

This invention relates to a tension control device, and especially to a device for controlling the tension in sheet material traveling from a roll.

The main object of this invention is to provide a control device which is completely adjustable and is highly efficient in operation, so that it will always maintain an even and uniform tension in a continuous sheet of material traveling from a roll.

Another object is to provide such a control device wherein the retarding means is equipped with quick throw-out means for speedily releasing the retarding effect.

A further object is to provide a control device arranged to produce a predetermined retarding effect under normal conditions, and which will automatically produce additional retarding and stopping of the roll when the material breaks or suddenly slackens, the device further including accurate adjusting means and quick throw-out means for both retarding means.

Another object is to provide control means for regulating tension in material which travels from a roll in the paper room up to the printing presses in the printing room above it, and wherein the tensioning or retarding means is accurately adjustable and can be readily actuated from the paper room and also from the printing room thereabove.

Still another object is to provide mechanism adapted for use with two swingably mounted and adjacently positioned pairs of rolls of material, so as to produce a slight retarding effect on the active rolls, and wherein said retarding mechanism is movable freely out of position to allow for the free swinging and adjusting of either pair of rolls with the supporting means thereof.

These and various other objects and advantages will become apparent from the following description, taken in connection with the accompanying drawings, in which the invention is shown in its preferred form, it being understood that various other arrangements and forms of construction may be resorted to for carrying out the objects and purposes of this invention.

In the drawings:

Fig. 1 is a perspective view illustrating this invention in its preferred form of construction, operating on a continued sheet of material drawn from a roll.

Fig. 2 is a side view illustrating my improved control device including a pair of primary retarding means mounted in combination and applied to a pair of adjacent sets of paper rolls.

Fig. 3 is an elevational detail view taken on line 3—3 of Fig. 2, illustrating the combined primary retarding means adapted to operate on a pair of adjacent sets of rolls.

Fig. 4 is a detail side view of the secondary brake with the means for readily adjusting it manually from either the paper roll room or from the printing room thereabove, and also illustrating the quick throw-out means for the brake.

Fig. 5 is an end view thereof, taken on line 5—5 of Fig. 4.

Fig. 6 is a detail side view of the automatic brake mechanism with its quick throw-out means.

This invention is adapted for controlling the tension in continuous sheets of material traveling from the rolls, such as rolls of paper, upwardly from the roll room 10 through the floor 11 of the printing room 12 located thereabove, to the printing press therein (not shown).

The mechanism for supporting and journalling the roll comprises a swingable supporting frame including a pair of side bars 13 which are connected centrally by a rod 14 mounted in bracket means or supporting posts 15, so as to be swingable and adjustable therein. Means (not shown) is connected to an extending end 16 of said rod 14 for swinging it and holding it firmly in place, to support the upper roll in the desired position and permit the material to be drawn therefrom, as is well-understood in this art; and means 17 is provided at the ends of the pair of bars 13 for centering and rotatably supporting the two rolls of material between said ends. While the sheet of paper or material 18 is drawn from the upper roll 19 mounted between the upper ends of said bars, a new roll 20 can be mounted between the lower ends of the bars, to be thereafter swung into the proper upward position when the upper roll has been depleted.

In this invention the continuous sheet of material 18 travels from roll 19 over a guide roller 21 which is journalled by means 22 in stationary brackets 23 secured under beams 24 of floor 11. The material then travels from roller 21 around a swingable roller 25 which is journalled with its end stems 26 in bearing blocks 27 which are adjustably mounted in a pair of swingable bracket arms 28, by the use of adjusting screws or elements 29 threaded in the lower ends of said bracket arms, and springs 30 are mounted in slots 31 in said arms between the inner ends

of said screws and the blocks, so that the blocks and roller 25 are adjustably mounted and at the same time provided with a certain degree of resilient movement within bracket arms 28. Said arms are swingably supported, preferably by bracket means 32 secured under floor beams 24, and a rod 33 extending through said bracket means 28 and 32. The sheet of material travels from said roller 25 through the slot 34 provided in floor 11; and the several sheets are then brought together and operated upon by the printing press, as is well understood.

This improved control device includes means which engages the roll of material and is driven thereby, whereby a certain retarding effect and tension is constantly applied to the traveling sheet of material. This means preferably comprises a plurality of endless members, for example, endless belts 35 which are mounted to travel on several sets of supporting members; and in the illustrated form of my invention said supporting members include a set of pulleys 36 secured on a shaft 37 which is journalled in bearing means 38 provided on the brackets 39 and 40 secured under the beams 24 of the floor above. The belts next travel over a second set of pulleys 41 mounted on a shaft 42 which is supported in brackets 43 provided on posts or uprights 44 which extend from the floor 10 of the paper roll room to the floor 11 of the printing press room 12 thereover. The belts next travel around a third set of pulleys 45 which are supported in the looped lower ends of the belts.

The belts or endless members engage the material on the roll and are driven by such engagement to travel over pulleys 36, 41 and 45; and as these belts are of flexible material they will curve or arc properly on the roll whatever the size of the roll may be, whether full or depleted, as indicated in the drawings.

The lower pulleys 45 are weighted, each pulley being journalled in a pair of upstanding plates or arms 46 on weights 47, said arms having laterally projecting ears or lugs 48 containing openings which receive guide rods 49 arising from a shaft 50 which is mounted to turn in the lower parts of uprights 44. A bar 51 is secured on the upper ends of said rods, and springs 52 are mounted on the rods between ears 48 and collars 53 which are threaded and adjustable on the upper ends of said rods, thereby providing adjustment for the springs and to their depressing effect upon the weights and pulleys supported thereby.

With this adjustable arrangement the tension of the springs can be accurately adjusted, to provide the desired primary or initial retarding effect on the endless members 35 and therethrough on the roll of material. The springs will also function to compensate for the variation in the size of the roll, from the full roll to the depleted roll, since the springs slacken and decrease their depressing effect as the weights and pulleys descend while the roll of material becomes smaller during operation.

A slight tensioning effect upon the unreeling material is thus uniformly maintained automatically through the belts and the weights, to provide a primary retarding effect on the roll. Said retarding effect can further be modified by adjusting the side bars 13 and swinging the active upper roll 19 downwardly, thereby producing a greater arcing contact between the roll and the belts and causing a greater tension in the belts and a greater retarding effect on the roll and the material.

As best shown in Figs. 2 and 3, my novel arrangement and mounting of the primary retarding means provides for swinging the same sufficiently out of the normal position, by turning upon shaft 50 which is journnalled in uprights 44, as indicated by the dot-and-dash lines thereof in Fig. 2, so as to allow for the free and complete swinging of a pair of full rolls with their supporting bars, as indicated by the dot-and-dash lines of rolls 119 and 120 and their supporting bars 113, from their normal positions indicated by the broken lines in said Fig. 2.

The members of the control devices for the adjacent sets of rolls of material are identical, and the pulleys 145 and weights 147 on belts 135, of the second set of rolls are identical with those of the first set of rolls, and are slidable on guide rods 149 having springs 152 thereon. The two sets of primary retarding means for the two sets of adjacent rolls are herein mounted in alternating positions, and both sets are fastened to the turnable shaft 50 and the upper bar 51, as best shown in Fig. 3. Both sets are thus swingable upon shaft 50 in either direction, so as to automatically assume the proper position between the two sets of adjacent rolls and permit free swinging of either one of said sets of rolls, one set being swung at a time; and by this swingable arrangement and combining of two sets of primary retarding means, the sets of adjacent rolls to which they are applied can be placed closely together, and much valuable space is saved thereby.

Additional or secondary retarding means is provided for producing additional retarding effect and tension in the material as it travels from the roll; and this means is preferably in the form of brake means applied to one set of the movable supporting means or rotary elements, for example, to the rotary members or pulleys 36 through their shaft 37. This brake means as shown herein includes a brake drum 55 secured on a shaft 56 journalled in a bearing 57 provided at the lower end of bracket member 39. A gear 58 is secured on shaft 56 and is driven by a pinion 59 secured on shaft 37. Brake members or arms 60 carry shoes 61 which engage the drum 55, as best shown in Fig. 4; and these arms 60 are preferably connected pivotally by a pin 62 supported on an arm 63 extending from bracket 39. Such speed-reducing gear arrangement provides slower rotation for the drum, and consequently less friction between it and the brake shoes, thereby saving wear thereof.

Means is provided in this invention for applying and for accurately adjusting this secondary brake from either the paper roll room, or from the printing room 12 thereabove; and this means is preferably provided in the form of a rod 64 extending through openings in the outer ends of the pair of brake arms 60, and having threaded engagement with one of said arms, as in a boss 65 formed thereon. Said rod 64 has a knob or manually operable member 66 on its lower end, and it extends through floor 11 of the printing room, having a knob 66' on the upper end, so that the rod may be readily turned from either room for applying and adjusting the secondary brake. A spring 67 on rod 64 tends to spread arms 60 and release shoes 61 from the brake drum.

I also provide quick throw-out means for this

brake, so that it may be readily released when desired. Said means preferably comprises a collar 68 secured on rod 64, and a lever 69 pivoted on a lug 70 provided on lower arms 60, said lever having a cam portion 71 to bear on collar 68, for retaining said collar a certain distance away from arm 60 during operation, as indicated in full lines in Fig. 4. By swinging the lever, as indicated in dotted lines in Fig. 4, the cam permits the brake arm to move toward the collar, for quickly releasing the brake shoes from the drum whenever expedient.

In addition to the primary retarding and the secondary retarding means or brake means, which are used under normal conditions, I further provide automatic control means herein which functions under abnormal conditions, as when the material breaks, or when the material suddenly slackens considerably. This automatic control means preferably comprises a brake drum 72 secured on shaft 37, at the end opposite to that provided with pinion 59 of the secondary retarding means, also curved brake band means 73 which is supported at 74 on an arm 75 provided on bracket 40. Brake lining 76 is preferably provided inside of said band means for engaging drum 72. A rod 77 extends through the outer ends 78 of band means 73, and a manually operating member 79 is threaded to the lower end of said rod for adjusting the brake effect.

The means for automatically operating this brake includes an operating lever 80 pivoted to the upper end of said rod 77 and having a cam 81 on its lower end for tightening the brake means 73 when the lever is swung toward the right as seen in Fig. 6. A rod 82 is pivoted to lever 80 and to a finger 83 provided on the swingable bracket arm 28, a turnbuckle 84 being provided in rod 82, so that this automatic brake mechanism may be accurately adjusted for efficient operation.

With this arrangement and construction of the automatic retarding means, when the material is traveling under usual conditions and is under normal tension, as indicated in full lines in the drawings, the swingable roller 25 and its supporting arms 28 are forced upwardly by the traveling sheet of material, and thereby rod 82 and lever 80 are forced toward the left, as viewed in Fig. 6, thereby placing cam 81 in the release position. Then whenever the material breaks or when the pull on the material is suddenly decreased and the latter suddenly slackens, and the roll then endeavors to unreel ahead of the lead, the bracket arms 28 with roller 25 will descend, toward the dot-and-dash line position indicated in Fig. 6, thereby moving rod 82 and lever 80 toward the right into the dot-and-dash line position shown; thus tightening and clamping this brake on drum 72 through the action of cam 81, and therewith promptly checking and stopping the rotation of drum 72 and belts 35, and through their engagement with the roll promptly stopping the latter and preventing any further unreeling or slackening of the material.

Quick throw-out means is also provided on this automatic brake, and it preferably comprises a lever 86 pivoted on a lug 87 provided on one end 78 of band means 73, and having a cam 88 for engaging the collar 89 provided on member 79. Said lever 86 is normally in the operative position as shown in Fig. 6, and it is readily drawn outwardly to relieve the pressure of the cam on collar 89, and thereby quickly release this brake.

These quick throw-out means on the brakes are of great utility, as for example, when it is desired to quickly release both brakes so that the roll can be turned freely by hand, whenever it becomes necessary to tear a new tail in the end of the material on the roll.

I claim:

1. Tension control mechanism for material traveling from a roll through partition means to a room beyond the same, said mechanism comprising means which engages the material and is driven thereby, retarding means operable on the driven means to exert a retarding effect thereon and on the roll, and adjusting means including a plurality of means thereon for manually adjusting said retarding means from the room containing the roll of material and also from the room positioned beyond said partition means.

2. Tension control mechanism for material traveling from a roll through partition means to a room beyond the same, said mechanism comprising means which engages the material and is driven thereby, brake means operable on the driven means to exert a retarding effect thereon and on the roll, and means extending through said partition means and including a plurality of means thereon for manually adjusting said brake means from the room containing the roll of material and from the room positioned beyond said partition means.

3. The subject matter of claim 2 and including throw-out means for readily releasing said brake means.

4. Tension control mechanism for material traveling from a roll through partition means to a room therebeyond, said mechanism comprising means engaging the material and driven thereby, a brake supported on said partition means and operable on said driven means to retard the movement of the roll, rod means on the brake extending through said partition means, and means on the rod means for manually actuating it and applying and adjusting the brake from the room containing said roll and also from the room positioned beyond said partition means.

5. The subject matter of claim 4 and including quick throw-out means connected with said rod and said brake for quickly releasing the latter.

6. A tension control device for material traveling from a roll through the floor means positioned thereover and into the printing room positioned thereabove, said device comprising endless means engaging the material and driven thereby, supporting means including rotary means for supporting the endless means, drum means connected with and driven by said rotary means, means connected to said floor for supporting the rotary means and the drum, brake means applied to said drum means to retard it and the endless means and the roll, a rod extending through said floor and through means on said brake means and having threaded means thereon for adjusting said brake means, and handle means at the ends of said rod for manually adjusting said brake means from the room containing said roll and also from the printing room thereabove.

7. Tension control mechanism for material traveling from a roll, comprising means engaging the material on the roll and being driven thereby, means for normally causing a slight retarding effect on the roll, guide means over which the material travels and which is normally moved upwardly thereby, means actuated

automatically by the movement of said guide means upon any sudden slackening of the material and including adjusting means for causing a strong retarding effect upon the driven means and the roll and for stopping the same upon tearing of the material, and quick throw-out means connected with said adjusting means and said automatic retarding means for quickly releasing the same.

8. Tension control mechanism for material traveling from a roll, comprising means engaging the material on the roll and driven thereby, means connected with said driven means for exerting a slight retarding effect thereby on the roll and the material, secondary means for causing additional retarding effect on said driven means, means automatically actuated for placing strong retarding effect on the driven means and the roll when the material suddenly slackens or breaks, and quick throw-out means on said automatic retarding means.

9. Tension control mechanism for material traveling from a roll, comprising means engaging the material on the roll and driven thereby, means connected with said driven means for exerting a slight retarding effect thereby on the roll and the material, secondary retarding means including adjustable brake means adapted to apply additional selected retarding effect on the driven means and roll, automatic brake means for causing a strong retarding effect on the driven means and roll to stop the same when the material breaks or suddenly slackens, means for accurately adjusting said automatic brake means, and quick throw-out means provided for each of said two brake means.

10. A tension control device adapted for a pair of sheets of material traveling from a pair of swingably mounted adjacently positioned rolls, said device comprising a pair of similar endless means each of which engages the material on one of said rolls and is driven thereby, means supported in each of said endless means, weight means on said supported means for placing tension in the endless means, and swingable means for guiding all of said endless means and supported means, and being mounted to swing out of the path of at least one of said rolls and enable free swinging of the latter.

11. A tension control device adapted for a pair of sheets of material traveling from a pair of swingably mounted adjacently positioned rolls, said device comprising two sets of endless means, each of which engages one of the rolls and is driven thereby, a shaft movably supported between said rolls, two sets of rods arising from said shaft, said rods alternating in pairs for the two sets of endless means, a set of pulleys supported in each set of endless means and having weight means thereon, each pulley and weight means being guided by a pair of rods, thereby placing tension on said endless means and retarding travel thereof and of the rolls, said pulleys and weights and rods being together swingable on the shaft out of the path of swinging movement of either roll.

12. Tension control mechanism for material traveling from a swingably mounted roll, comprising endless means engaging the material on the roll and driven thereby, weight means and rotary means carried by said driven means for exerting a slight retarding effect thereby on the roll and the material, means for swingably mounting said weight means and said rotary means to allow free swinging of said roll, secondary retarding means including adjustable brake means adapted to apply selected retarding effect on the driven means and the roll, guide means whereon the material travels, automatic brake means actuated by said guide means for causing a strong retarding effect on the driven means and roll to stop the same when the material breaks or suddenly slackens, means for accurately adjusting said automatic brake means, and quick throw-out means provided for each of said two brake means.

13. A tension control device adapted for material traveling from a swingably mounted roll, comprising endless means engaging the material and driven thereby, means bearing on the endless means and provided for causing tension in said endless means, and means for mounting said tension causing means so as to be swingable out of the path of movement of said roll and enable free swinging movement of the latter.

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