Aug. 13, 1963 W. GROB 3,100,511

SPEED REGULATED LET-OFF

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Fig. 1

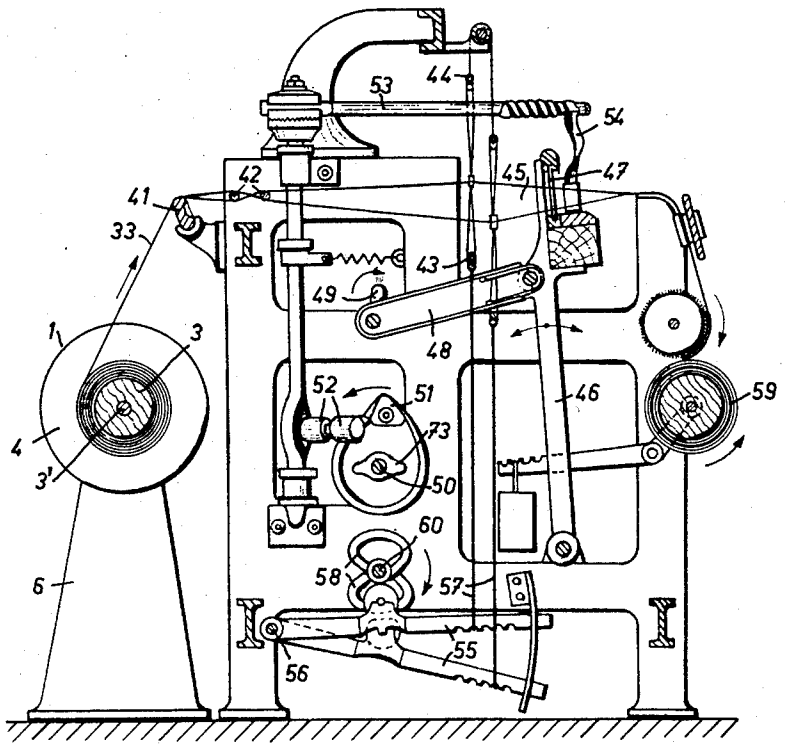

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Fig. 2

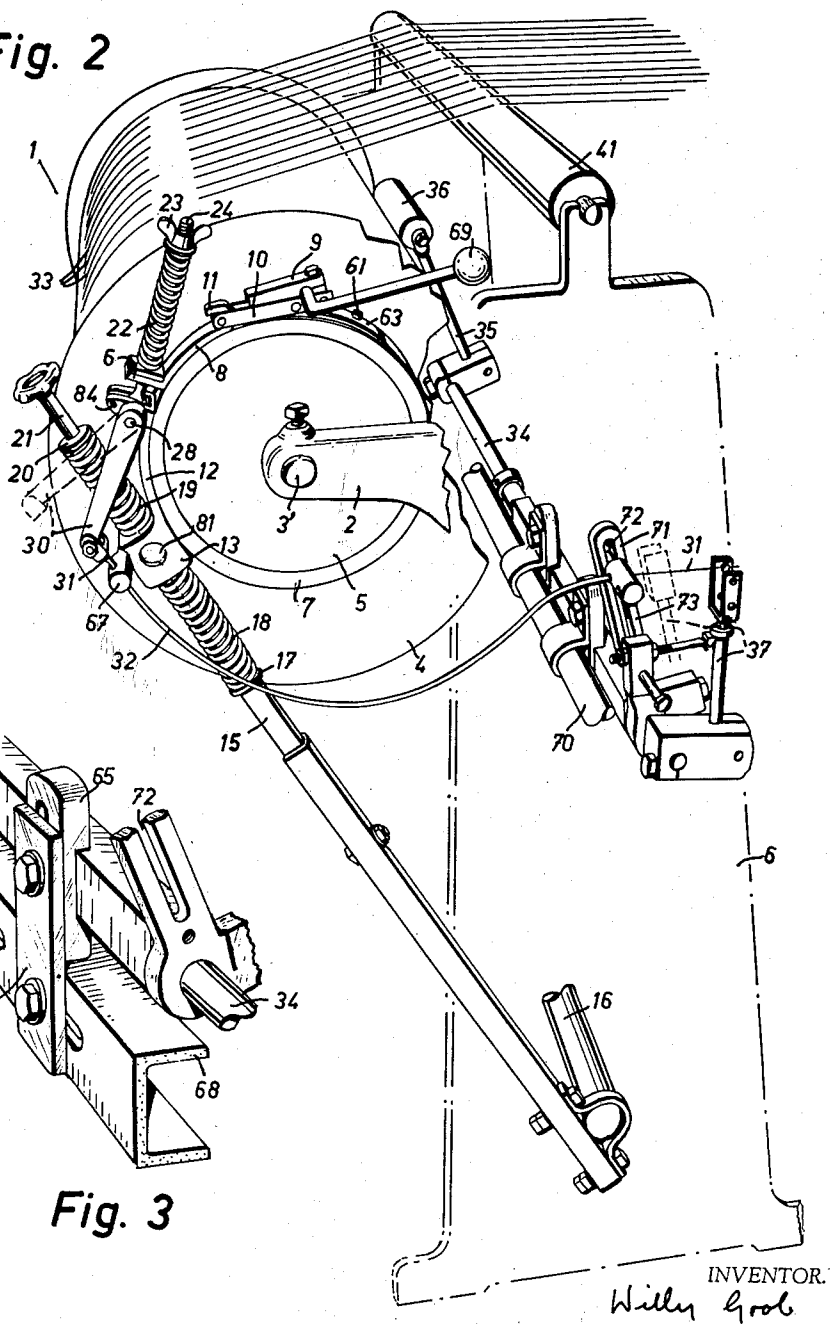

Fig. 3

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Fig. 4

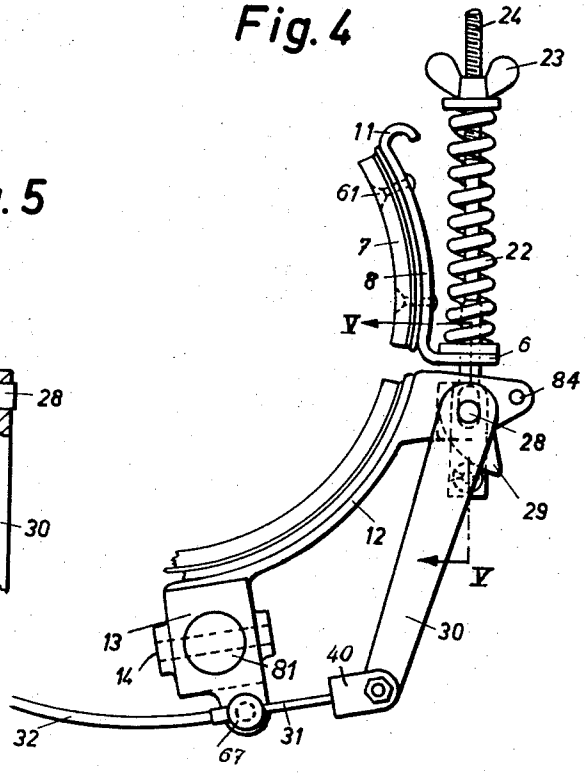


Fig. 5

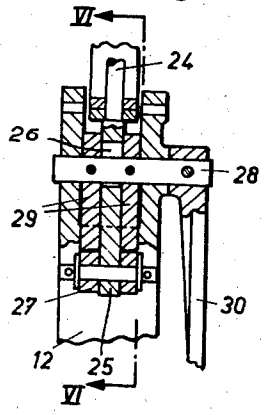
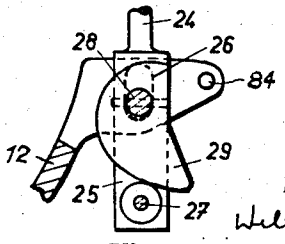


Fig. 6



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SPEED REGULATED LET-OFF

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2 Claims. (Cl. 139—107)

The present invention relates to a warp beam and particularly to an improved warp beam brake. A warp beam brake serves to effect retardation of the warp beam during the progressive production of the cloth in order that a definite tension, which remains as constant as possible, can be exerted on the warp yarns. Care must therefore be taken that after every pick of the shuttle a quiet uniform rotation of the warp beam occurs. This is in fact a critical factor especially after stoppage of the loom since the warp threads expand or contract during the period of stoppage.

It is therefore a first object of this invention to provide a warp beam with which the constant tension of the warp threads and the regularity in the rotation can be substantially improved so that thereby the uniformity and quality of the cloth produced will be increased.

It is a further object of the invention that even after the first passage of the shuttle after stoppage of the loom there will be a reliably secured let-off of the warp beam, so that fabrics which are very difficult to produce can be woven with a regularity that could not previously be reached.

A further object of this invention is to permit of manufacturing the warp brake very simply and inexpensively.

A further object of the invention is that no additional superimposed variation in the braking force as a result of the pendular movement of the brake band will be procreated.

These and further objects and the entire scope of applicability of the present invention will become readily apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

In the drawings:

FIG. 1 is a diagrammatic view of a loom having a warp beam,

FIG. 2 is a perspective general view of the warp beam brake according to the invention,

FIG. 3 is a detail perspective view of the warp beam brake according to FIG. 2,

FIG. 4 is a front view of another detail of the braking device according to FIG. 2,

FIG. 5 is a section on the line V—V in FIG. 4, and

FIG. 6 is a detail in section on the line VI—VI in FIG. 5.

FIG. 1 shows diagrammatically a mechanical loom incorporating a warp beam 1. The warp yarns 33 are wound on this warp beam 1 and are drawn off in the direction of the arrow during the weaving process. These warp yarns 33 pass from the warp beam 1 over a back rest 41 and after passage of this point they are separated by dividing rods 42. A shed 45 is formed by the heddles 43, 44 for the passage of the shuttle, not shown in the drawings. A red 47, also known as a beater, is pressed against the cloth after every pick of the shuttle. The reed 47 is mounted on a slay 46 reciprocated by means of a connecting rod 48 from the main shaft 49 by means of a crank. The main shaft 49 is connected with a drive

shaft 50 through gearing, not shown, which drives the main shaft 49 twice as fast as the driving shaft 50. A picking cam 51 mounted on the driving shaft 50 cooperates with a roller 52 on a vertical shaft for a picking stick 53 which moves the picking belt 54 for actuating the shuttle. Treadles 55 pivotally mounted on a spindle 56 are connected by cables 57 to the heddles 43, 44 and are moved by cams 58 mounted on a shaft 60. This shaft rotates at the same speed as the shaft 50. The finished cloth is wound on a roll 59. Obviously other constructions of looms may be adopted.

The warp beam 1 according to FIG. 2 is supported by a stand. For this purpose two spaced supports 6 shown in phantom are provided, to each of which an arm 2 is rigidly fastened. The warp beam 1 comprises right and left discs 4 or beam heads mounted on a central tube 3 (FIG. 1) or cylindrical barrel in such manner that they can be adjusted therealong to vary the width of the warp space between them. The central tube 3 is supported by means of a shaft 3' arranged coaxially within this tube 3. The warp yarns 33 to be handled by the loom are wound on the tube 3 between the discs 4. A brake drum 5 (FIG. 2) is rigidly fastened to the outer side of each of the discs 4, against the peripheral surface of which a brake band 7 is applied. The brake band 7 encloses approximately the whole periphery of the brake drum and is connected at its ends to two holders 8 and 12. The brake band 7 is rigidly fastened at one end to the holder 12 by means of rivets such as shown at 61 at the other end of the brake band, or by other equivalent fastening means. It is however also possible for the brake band to be fastened in a readily removable manner to the holders for example by means of hooks. The holder 8 embodies a hook 11 at one end which is suspended by a clip 10 from a plate 63, and the respective end of the brake band is joined to the plate 63 by rivet means 61. The movement of a hand grip 69 operatively connected with a toggle lever 9 permits disengagement of the brake band 7 so that it can then be removed and replaced by a larger or smaller brake band.

A lug 13 or stop is rigidly fixed or welded to the holder 12 and is provided with a bore 14 (FIG. 4) in which a rod 15 (FIG. 2) is axially slidable with a certain amount of free play and thus a rocking movement of the holders 8 and 12 and the brake band within certain limits is permitted around the shaft 3' as a pivot. This rod 15 is supported by a rod 16. A disc 17 resting against a collar is fitted to the rod 15, against which a compression spring 18 surrounding the rod 15 bears, said spring laying between the disc 17 and the lug 13. A further compression spring 19 lies between the opposite side of the lug 13 and a further stop disc 20. These springs 18 and 19 may also be replaced by rubber tubes or other resilient means. Rotation of a threaded nut 21 mounted on a threaded end part of the rod 15 permits the two compression springs 18 and 19 to be more or less compressed. On oscillation of the warp beam 1 in one direction the spring 19 absorbs the impact while the compression spring 18 absorbs the movement of the warp beam 1 in the other direction so that the warp beam can rock slightly by means of the two compression springs 18, 19. The tension of the warp yarns 33 during the beating motion of the reed 47 is set to a force suitable for the particular cloth being produced.

A further compression spring 22 or other tensioning means lies between a bent end part 6 of the holder 8 and a wing nut 23 and surrounds a threaded rod 24 which at its lower end continues as a flattened part 25 (FIG. 5). This flattened part is provided with an elongated aperture 26 the length of which extends parallel to the longitudinal axis of the rod 24. At the lower end of this

flattened part are provided two rotary rollers 27 which lie against two eccentrics or cams 29 (FIG. 5) spaced from each other and rotatable by being fastened to a spindle 28. The flattened part 25 thus lies between the eccentric discs or cams. The spindle 28 is rigidly fastened to a radially projecting arm 30 so that on rocking the arm 30 rotation of the eccentrics 29 is obtained about the axis of the spindle 28 and consequently axial displacement of the threaded rod 24 is obtained. Thus there is secured a variable compression of the spring 22 and as a result the holders 8 and 12 are forced together so that the brake band 7 is pressed more or less tightly against the brake drum 5 and thereby the braking force acting on the warp beam can be varied.

The end of the arm 30 remote from the spindle 28 is connected by means of a connecting element 40 (FIG. 4) with the inner cable 31 or wire of a Bowden cable or with a flexible shaft or cord. Such a Bowden cable is known in itself and is commonly used particularly for bicycles. The inner cable 31 of the flexible Bowden cable, preferably consisting of steel wires, is connected at the end opposite to the arm 30 with a swing arm 37 (FIG. 2) which is rigidly connected by means of a horizontal rod 34 with a feeler lever 35. The outer casing 32 of the Bowden cable is fixedly connected by means of a sleeve 67 or other suitable clamp member to the lug 13 which serves as a support or stop for the outer cable.

The feeler lever 35 is provided with a roller 36 which presses against the periphery of the warp yarns wound on the shaft of the warp beam 1. With diminishing diameter of the warp yarn coil the feeler lever 35 pivots around the axis of the horizontal rod 34. As shown in FIGS. 2 and 3 the rod 34 is supported by lugs 65, 66 either by means of a profile member 68 (FIG. 3) or a rod 70 (FIG. 2) and is mounted so that it can swing. The end of the Bowden cable casing 32 remote from the sleeve 67 is also held by means of a sleeve 71 or like clamp member against a fixed arm 73 provided with a slot 72. On rocking of the feeler lever 35 the inner cable 31 is more or less drawn out of its casing 32 by the rocking arm 37 and thus exerts a variable compression on the spring 22 with the aid of the eccentrics 29, which results in a greater or smaller pressure of the brake band 7 on the brake drum 5 depending on the diameter of the warp yarn coil. The two end positions of the lever 30 are indicated in FIG. 2. The construction is such that for the maximum diameter of the warp yarn coil, greater pressure is exerted by the brake lining on the brake drum than for a smaller diameter of the warp yarn coil since the braking force must be proportional to the radius of the warp yarn coil if the warp yarn tension is to be held constant or approximately constant during variations of the diameter of the coil.

It would also be possible to use a tension cable or cord with guide wheels preferably adjacent the shaft 3', in place of a Bowden cable 31.

Further it is possible to control a plurality of warp beams from a single feeler lever 34 wherein simply a number of correspondingly extended Bowden cables are used for the individual warp beams.

Since the transmission of the movement of the feeler member to the eccentrics or cams is effected by a flexible member there is no undesired additional movement of the compression springs as a result of the rocking of the brake lining about the axis of the brake drum.

As stated, the brake device according to FIG. 2 will normally be provided on both sides of the warp beam.

Having thus described the present invention, what is desired to be secured by United States Letters Patent, is:

1. In a loom, in combination, a rotary warp beam for supporting and for paying out a supply of convoluted warp yarns; at least one brake drum coaxially fixed to and rotatable with said warp beam; a brake band at least partially surrounding said drum and having a first end portion and a spaced second end portion; first and second holding means respectively connected with the first and second end portions of said brake band, said holding means and said brake band being angularly movable about said brake drum in clockwise and anticlockwise directions; first and second resilient means operatively connected with said first holding means for respectively resisting clockwise and anticlockwise angular movements of said holding means and of said brake band; third resilient means for biasing said first and second holding means toward each other and for thereby pressing the brake band against said brake drum; and means for regulating the bias of said third resilient means, said regulating means comprising movable feeler means engaging the convoluted warp yarns on said warp beam, motion transmitting means movably supporting said feeler means so that the latter may change its position to remain in engagement with the warp yarns when the warp yarns are paid out and the diameter of the supply of convoluted yarns on said warp beam decreases, and a Bowden wire including a tubular outer casing having a fixed first end and a second end connected with one of said holding means, and an inner cable slidable in said casing, said inner cable having a first end operatively connected with said motion transmitting means and a second end operatively connected with said third resilient means for changing the bias of said third resilient means proportionally with changes in the diameter of the supply of warp yarns on said warp beam.

2. In a loom, in combination, a rotary warp beam for supporting and for paying out a supply of convoluted warp yarns; at least one brake drum coaxially fixed to and rotatable with said warp beam; a brake band at least partially surrounding said drum and having a first end portion and a spaced second end portion; first and second holding means respectively connected with the first and second end portions of said brake band, said holding means and said brake band being angularly movable about said brake drum in clockwise and anticlockwise directions, one of said holding means including a supporting member; first and second resilient means operatively connected with said first holding means for respectively resisting clockwise and anticlockwise angular movements of said holding means and of said brake band; third resilient means for biasing said first and second holding means toward each other and for thereby pressing the brake band against said brake drum; and means for regulating the bias of said third resilient means, said regulating means comprising movable feeler means engaging the convoluted warp yarns on said warp beam, motion transmitting means movably supporting said feeler means so that the latter may change its position to remain in engagement with the warp yarns when the warp yarns are paid out and the diameter of the supply of convoluted yarns on said warp beam decreases, and flexible cable means operatively connected with said motion transmitting means and with said third resilient means for changing the bias of said third resilient means proportionally with changes in the diameter of the supply of warp yarns on said warp beam; the operative connection between said flexible cable means and said third resilient means comprising a rod slidably guided by said supporting member of one of said holding means, said rod having stop means spaced from said supporting member and an end portion extending toward the other holding means, lever means having a first end pivotally connected to said flexible cable means and a second end pivotally connected to said other holding means, and a connecting mechanism between said lever means and the end portion of said rod for axially moving the rod in response to pivotal movements of the lever means about said second end thereof and vice versa; said connecting mechanism comprising a spindle turnably mounted in said other holding means and rigid with said lever means, cam means mounted on and turnable with said spindle, and follower means connected with said rod and tracing said cam means; said third resilient means com-

prising a helical expansion spring surrounding said rod and disposed between said step means and said supporting member so as to bias said step means in a direction away from said supporting member and to pivot said lever means in a direction to maintain the feeler means in engagement with the warp yarns.

References Cited in the file of this patent

UNITED STATES PATENTS

1,651,334	Mintel	Nov. 29, 1927
1,739,232	Holmes	Dec. 10, 1929
2,271,202	Moessinger	Jan. 27, 1942
2,646,081	Ritsky	July 21, 1953
2,958,341	Grob	Nov. 1, 1960

FOREIGN PATENTS

1,195,032	France	May 11, 1959
884,330	Germany	July 8, 1949
708,289	Great Britain	May 5, 1954