Feb. 17, 1942. C. D. BROWN 2,273,460

WHIP ROLL

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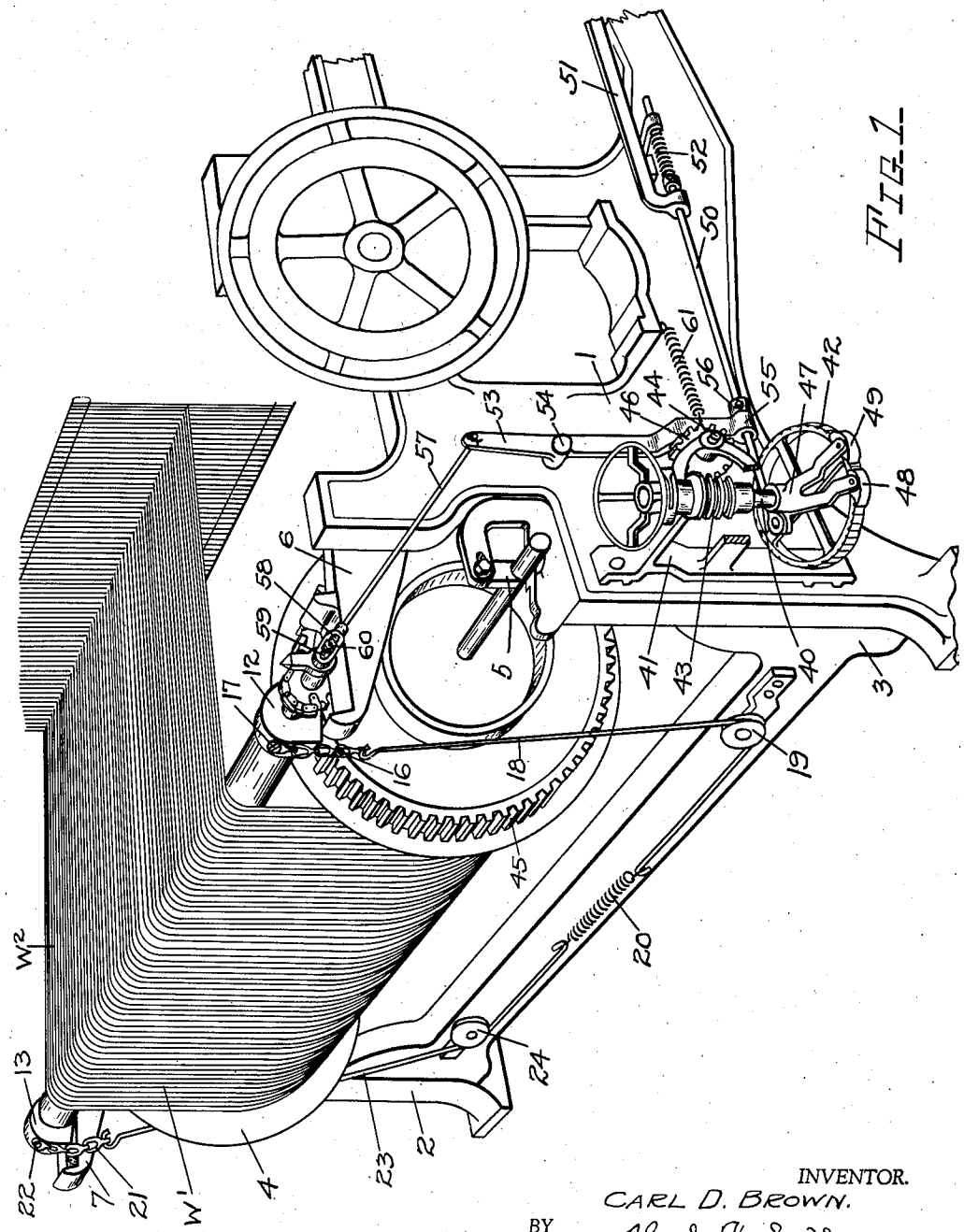


FIG. 1

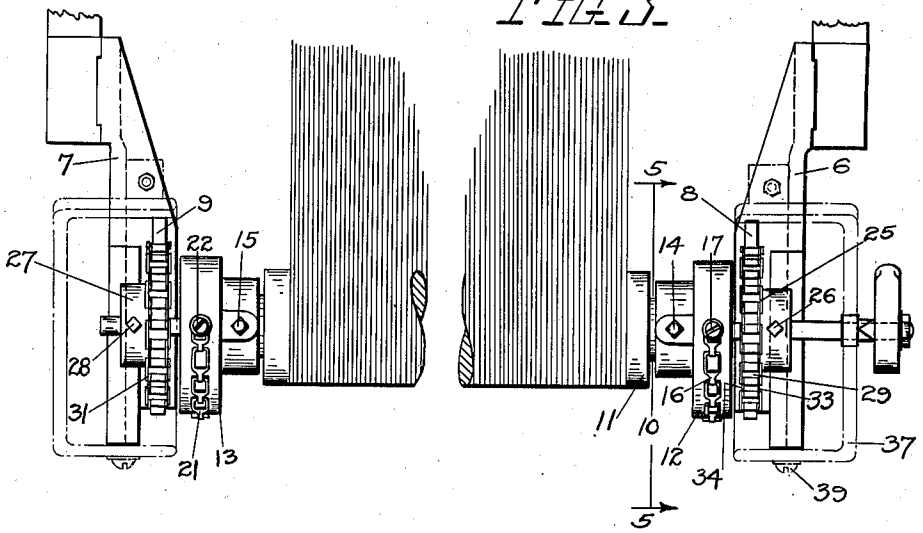
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FIG. 3



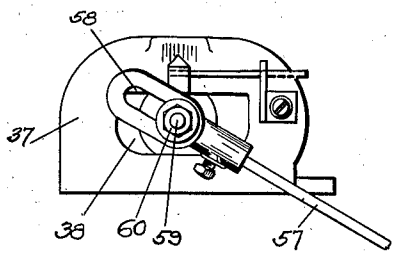


FIG. 2

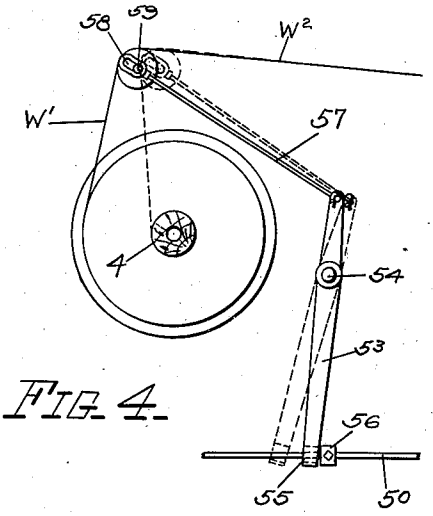


FIG. 4

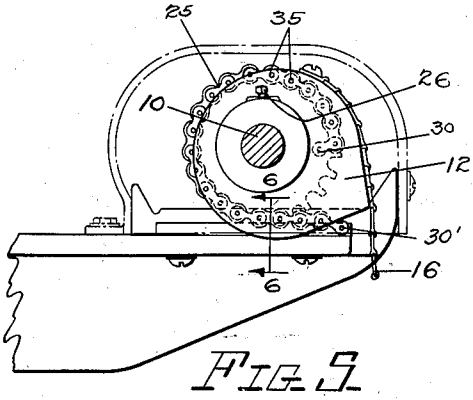


FIG. 5

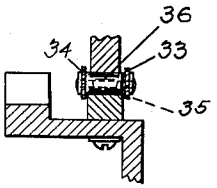


FIG. 6

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WHIP ROLL

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Application February 25, 1941, Serial No. 380,525

2 Claims. (Cl. 139—114)

This invention pertains to let-off mechanisms for looms and more particularly relates to mechanisms for controlling the rate of rotation of the warp beam by the let-off mechanism.

Let-off mechanisms, whether of the positive or friction type, usually include a warp beam carrying the warp supply and rotatably mounted on the loom, mechanism for controlling the rate of rotation of the warp beam, and a whip roll structure for supporting and tensioning the warp sheet.

Certain prior types of such let-off mechanisms provide for partial or complete control thereof by the whip roll structure. Such prior devices, however, have been either too complicated and expensive to manufacture or have required the complete disassembly of the whip roll structure when necessary to replace or repair broken parts.

Accordingly it is a principal object of the present invention to provide in a loom having a let-off mechanism including a warp beam and mechanism for controlling the rotation of the warp beam, a new and improved whip roll structure for completely controlling the rate of rotation of the warp beam, which whip roll structure shall be simple and inexpensive and permit repair of broken parts without disassembly thereof, said structure comprising a shaft having a sprocket wheel and roller chain mounted on each end, supports for supporting the sprocket wheels and chains, yielding means applying an even pull at each end of the shaft for urging the whip roll rearwardly against the warp sheet and means connecting one end of the shaft to the mechanism for controlling the rotation of the warp beam for controlling the left-off mechanism thereof.

This and other objects of the invention are accomplished by the construction illustrated on the accompanying drawings, of which:

Fig. 1 is a perspective view of a loom having the preferred embodiment of my invention applied thereto;

Fig. 2 is an end view of certain parts of the mechanism shown on Fig. 1;

Fig. 3 is a plan view of the whip roll structure shown on Fig. 1;

Fig. 4 is a diagrammatic view illustrating the operation of the mechanism;

Fig. 5 is a view in cross-section taken on line 5—5 of Fig. 3; and

Fig. 6 is a view in cross-section taken on line 6—6 of Fig. 5.

The drawings show only the parts of the loom to which my invention has been applied, parts of the loom not shown being of the usual construction and forming no part of the present invention.

The conventional parts of the loom shown include the left hand side frame 1, right hand side frame 2, rear girt 3, warp beam 4 rotatably mounted in a pair of bearings fixed on the side frames, only the left hand bearing 5 being shown. The wrap sheet extends upwardly from the warp beam at W^1 and forwardly substantially horizontally at W^2 to the front of the loom.

A pair of brackets 6 and 7 are vertically adjustably secured to the side frames 1 and 2 respectively. The brackets are parallel and extend longitudinally of the loom. The upper surfaces of the brackets are substantially horizontal and each bracket is provided with a rectangular metal strip 8 and 9 for a purpose later to be described.

A whip roll structure is mounted on the brackets, such structure may comprise a shaft 10 having a whip roll 11 rotatably mounted thereon. Eccentric sheaves 12 and 13 are fixedly attached to the outer ends of shaft 10 by means of set screws 14 and 15 passing through the collars of the sheaves. A flexible element 16 is secured at one end to the sheave 12 as at 17, the other end of the flexible element 16 is secured to one end of a flexible strap 18 which passes around a sheave 19 attached to the girt 3 directly below the eccentric sheave 12. The other end of strap 18 is adjustably connected to a coiled spring 20. A flexible element 21 is secured at one end to the eccentric sheave 13 as at 22, the other end of flexible element 21 is secured to one end of a flexible strap 23 which passes around a sheave 24 attached to the girt 3 directly below the eccentric sheave 13. The other end of strap 23 is adjustably connected to one end of coiled spring 20.

The ends of shaft 10 extend beyond the eccentric sheaves 12 and 13 and are reduced in size. A sprocket wheel 25 is fixedly attached to the reduced portion of the left end of shaft 10 by means of a set screw 26 passing through the collar of the sprocket wheel. A sprocket wheel 27 is fixedly attached to the reduced portion of the right end of shaft 10 by means of a set screw 28 passing through the collar of the sprocket wheel. A roller chain 29 is mounted on the sprocket wheel 25 and has one end fixed to the sprocket wheel 25 as at 30 and the other end fixed to the rear end of strip 8 as at 30'. A roller chain 31 is mounted on sprocket wheel 27 and has one end fixed to the sprocket wheel and the other end fixed to the rear end of strip 9 the points of attachment not being visible on the

drawings, but are similar to the construction on the left hand sprocket wheel. As the shaft 10 turns the sprocket wheels 25 and 27 roll back and forth along strips 8 and 9 respectively, the roller chains 29 and 31 acting to support the sprocket wheels on roller bearings and to prevent the sprocket wheels from sliding on the strips.

The particular type of roller chains employed is immaterial, such roller chains may comprise a series of parallel links 33 and 34, each pair being connected to the succeeding pair by pins 35 upon which are mounted rollers 36.

The length of the rollers is greater than the width of the track elements 8 and 9 and the diameter of the rollers is less than the height of the links 33 and 34 so that when the chain is in position on the track elements the links extend below the upper surface of the track elements, as best seen on Fig. 6, and act as side flanges to prevent displacement of the chain from the track element.

From the structure thus far described it is seen that the tension of the warp sheet tends to move the whip roll forwardly of the loom causing the shaft 10 and the sprocket wheels 25 and 27 to have a rotary as well as forwardly lateral movement. This forward movement is against the pull of the coiled spring 20 and when the pull of the coiled spring 20 exceeds the tension of the warp sheet the whip roll will be moved rearwardly of the loom by the pull of spring 20.

As the warp supply becomes depleted, the decreasing angle between the portions W^1 and W^2 of the warp sheet results in an increased forward pull on the whip roll even though the tension of the warp sheet remains constant. This is diagrammatically shown on Fig. 4 where the position of the warp sheet and whip roll when the warp beam is full is shown in full lines and the position of the warp sheet and whip roll when the warp supply is substantially exhausted is shown in broken lines.

The eccentric sheaves 12 and 13, as best seen on Fig. 5, however, are compensating sheaves, that is, the sheaves are so shaped that as the whip roll rolls forwardly the flexible elements 16 and 21 act on increasing radii of the sheaves to thereby provide a constantly increasing resistance to the forward movement of the whip roll. The compensating sheaves may be variously shaped to produce various predetermined relationships between the forward movement of the whip roll and the quantity of warp supply remaining on the warp beam. The particular sheaves shown are so shaped that the tension on the warp sheet and other factors remaining constant, the forward movement of the whip roll is directly proportional to the quantity of warp supply that has been woven off the warp beam.

Housings may be provided to enclose the sprocket wheel, roller chain and strip at each end of the whip roll structure. The housing for the left hand end of the whip roll structure is shown in Fig. 2 and Fig. 3. Such housing may comprise a single casing 37 having top, end and side walls with a slot 38 in the end wall for a purpose later to be described. The housing may be secured to the bracket 6 by means of screw 39. A similar housing, with the slot omitted may be provided at the right hand end of the whip roll structure.

In accordance with my invention connecting means are provided between the whip roll structure and the mechanism for rotating the warp beam. The particular type of mechanism used for rotating the warp beam is immaterial. By way of illustration, I have shown my whip roll structure as used with a positive type of let-off, the particular type shown being similar to the well known Bartlett type.

The mechanism for rotating the warp beam may comprise a vertical shaft 40 supported by a bracket 41. Shaft 40 has a ratchet wheel 42 fixed thereto at its lower end and a worm 43 fixed thereto intermediate its ends. A horizontal shaft 44 has a pinion, not shown, on one end engaging the gear 45 on the warp beam and a worm wheel 46 on the other end engaging the worm 43. A pawl carrier 47 having pawls 48 and 49 oscillates on vertical shaft 40. A rod 50 pivoted to the pawl carrier is pulled forwardly by a reciprocating link 51 to thereby rotate the ratchet wheel 42 and shaft 40 in a direction to effect let-off of the warp sheet from the warp beam. The return stroke of rod 40 is effected by a compression spring 52.

The means for controlling the rate of let-off may comprise a lever 53 pivotally mounted on the side frame 1 as at 54. The lower end of lever 53 is apertured as at 55 to slidingly engage rod 50 rearwardly of a collar 56 fixedly secured to rod 50. The upper end of lever 53 is pivotally connected to the lower end of a link 57. The upper end of link 57 is provided with a slot 58 in which the extension 59 of shaft 10 slides. A nut 60 holds the slotted end of link 57 in place. A spring 61 pulls the lower end of lever 53 to a position determined by the engagement of the forward end of slot 58 with the extension 59. The spring 61 is appreciably stronger than spring 52.

Thus it is apparent that when the whip roll is at its rearward position, the end 55 of the lever 53 will have pushed the collar 56 and thereby rod 50 to its forwardmost position, thus holding the rod 50 from moving very far rearwardly thereby reducing the amount of the feeding stroke of the pawls and reducing the amount of warp let-off from the warp beam. When the whip roll moves in the forward direction the amount of warp let-off is increased. Thus the amount of warp let-off is controlled by the position of the whip roll.

Having thus fully described the preferred embodiment of my invention, I claim:

1. In a loom including a warp beam and let-off mechanism for controlling rotation of the warp beam, a whip roll structure comprising a pair of spaced parallel brackets mounted on said loom above said warp beam, a track element mounted on each bracket and extending longitudinally of said loom, a shaft mounted on said track elements for rolling movement thereon toward and from the front of said loom, a whip roll rotatably mounted on said shaft, a sprocket wheel fixed to each end of said shaft, said sprocket wheels being mounted on and rolling along said track elements, a roller chain mounted on each sprocket wheel and having one end fixed to the wheel and the other end fixed to the rear end of the track element along which said wheel moves said chains being so mounted on said wheels that as said wheels roll forwardly said chains unwrap from said wheels and are superimposed on said track elements and as said wheels move rearwardly said chains are wrapped around said wheels, means carried by said chains for preventing displacement thereof from said track elements, the warp sheet from said warp beam

extending upwardly and forwardly about said whip roll, means for urging said whip roll rearwardly against said warp sheet and means operated by said shaft for controlling the let-off mechanism.

2. In a let-off mechanism for looms, the combination of a rotatable warp beam, supports comprising fixed track elements positioned one at each side of the loom above said warp beam, said track elements being parallel and extending longitudinally of the loom, a whip roll structure including a shaft having a whip roll rotatably mounted thereon and a fixed sprocket wheel at each end thereof, said sprocket wheels being adapted for a rolling movement along said track elements, a pair of roller chains, one of said chains being mounted on and having one end attached to one of said track elements and extending about and having its other end attached to one of said wheels, the other of said chains being mounted on and having one end attached to the other of said track elements and extending about and having its other end attached to the other of said wheels, thereby forming roller bearing surfaces for said wheels and preventing said wheels slipping on said track elements, the warp sheet from said warp beam extending upwardly and forwardly about said whip roll and thence forwardly substantially parallel to said track elements, means yieldingly urging said whip roll structure rearwardly to thereby tension the warp sheet, said means and said structure being so constructed and arranged that said structure is gradually moved forwardly along said track elements as the warp supply on said warp beam becomes depleted, and let-off means controlled by said whip roll structure for varying the speed of rotation of said warp beam in accordance with the position of said structure on said track elements.

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