June 5, 1951 G. F. BAHAN 2,556,055

WARP TENSION SET MARK ELIMINATOR

Filed June 19, 1950 3 Sheets-Sheet 1

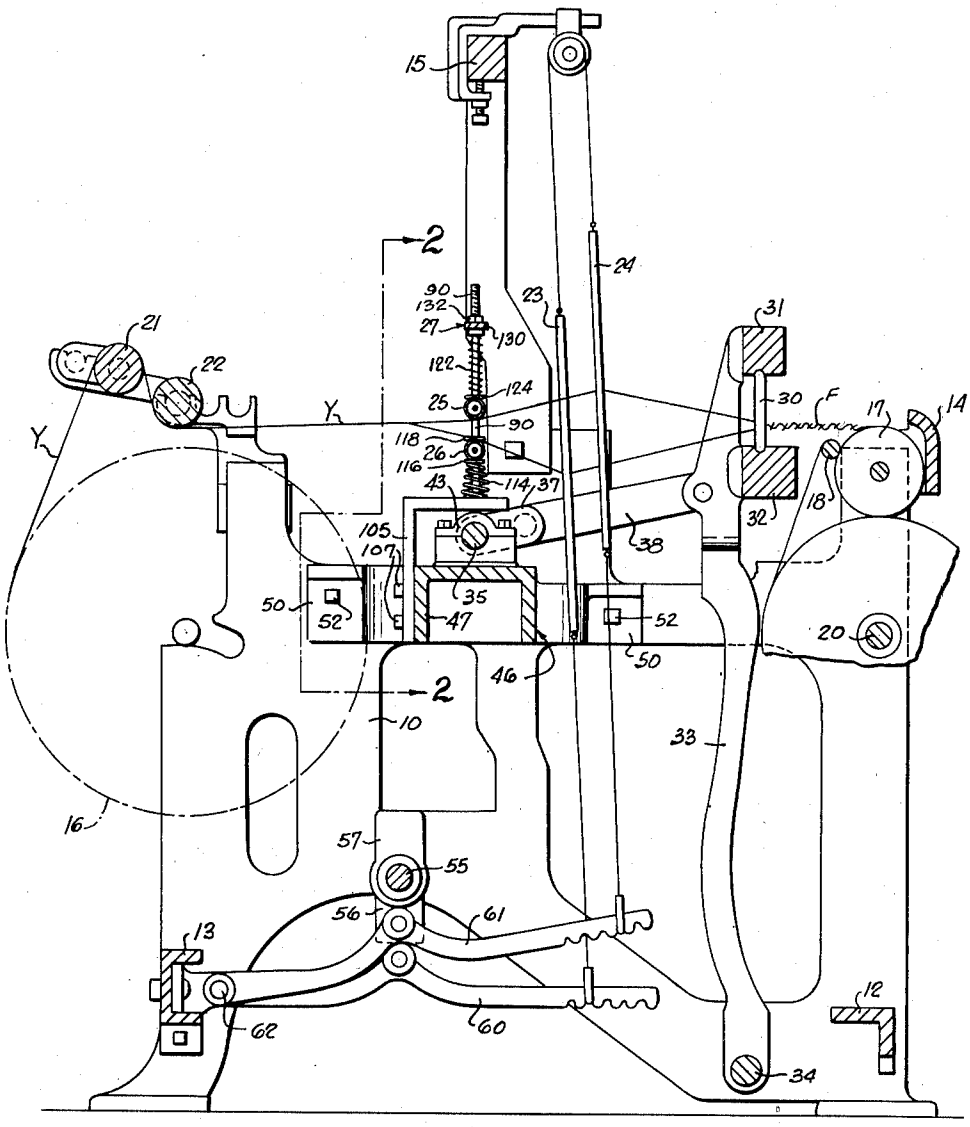


Fig. 1

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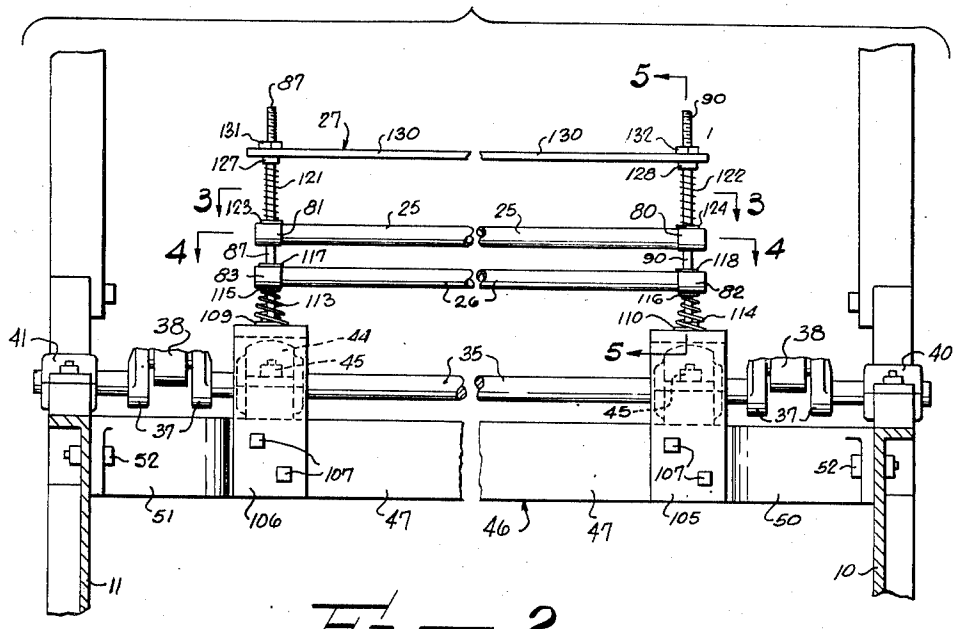


Fig. 2

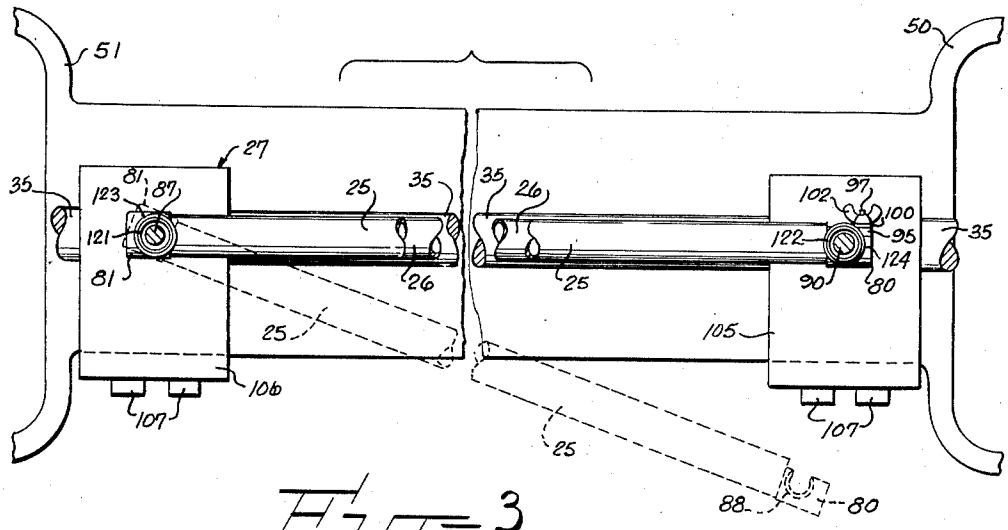


Fig. 3

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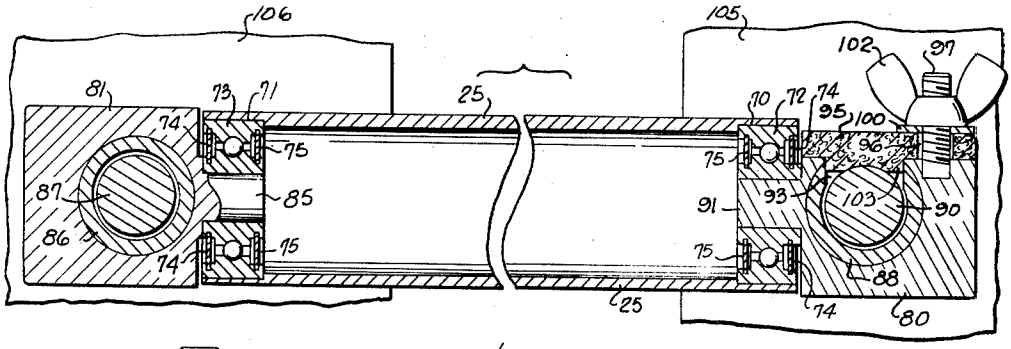


Fig-4

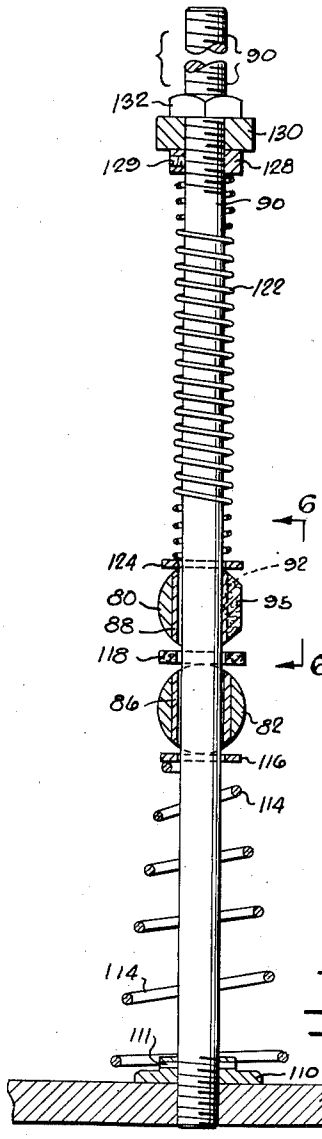


Fig-5

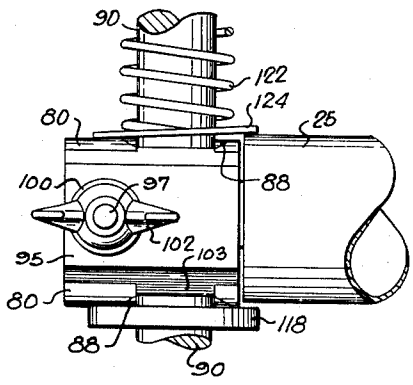


Fig-6

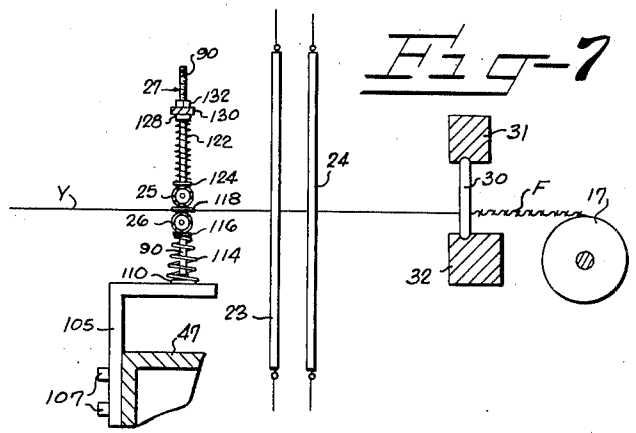


Fig-7

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UNITED STATES PATENT OFFICE

2,556,055

WARP TENSION SET MARK ELIMINATOR

George F. Bahan, Greenville, S. C.

Application June 19, 1950, Serial No. 168,980

9 Claims. (Cl. 139—97)

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This invention relates to textile machinery and more especially to an improved warp tension device for looms for preventing the occurrence of set marks at the beat-up point of the lay which usually occur as a result of a loom being stopped and then started.

It is an object of this invention to provide an improved set mark eliminator which is relatively simple in construction and may be easily applied to existing looms without the necessity of changing the looms materially.

It is another object of this invention to provide a pair of normally close vertically spaced horizontally disposed shafts which extend transversely of a loom and between which the warp yarns pass from the whip roll to the harnesses. The shafts are spring pressed so as to be urged toward each other and are disposed closely adjacent the rearmost harness so that when a shed is formed by the harnesses, the shed formed by the warp yarns rearwardly of the harnesses will extend between the shafts and will urge the shafts apart from each other with respect to the vertical. Thus, the warp yarns rearwardly of the harnesses will be placed under excessive tension during the forming of the shed by the harnesses and this will tend to pull the warp yarns rearwardly through the harnesses and away from the beat-up point of the lay so that, at the time of the initial beat-up stroke of the lay following a period in which the loom had not been in operation, the warp yarns will be taut thus minimizing the possibility of the occurrence of a set mark upon this initial beat-up stroke of the lay and during those beat-up strokes immediately following the initial stroke as has heretofore been the case.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings in which—

Figure 1 is a longitudinal vertical sectional view through a loom showing many of the parts schematically and showing the improved set mark eliminator associated therewith;

Figure 2 is a fragmentary elevation with parts in section looking substantially along the line 2—2 in Figure 1 with the central portion thereof broken away and omitting the warp yarns;

Figure 3 is an enlarged sectional plan view of the improved apparatus looking substantially along the line 3—3 in Figure 2 and showing the uppermost shaft in solid lines in operative position and also showing the uppermost shaft in dotted lines to indicate the manner in which it

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may be swung for extending the warp yarns through the apparatus during loom set-up operations;

Figure 4 is an enlarged sectional plan view through one of the shafts taken substantially along the line 4—4 in Figure 2;

Figure 5 is an enlarged vertical sectional view taken substantially along the line 5—5 in Figure 2;

Figure 6 is an enlarged fragmentary elevation looking substantially along the line 6—6 in Figure 5;

Figure 7 is a schematic view of the medial portion of Figure 1 showing the harnesses in a different position from that of Figure 1 to illustrate the manner of operation of the improved set mark eliminator.

Referring more specifically to the drawings, the numerals 10 and 11 indicate the two side frames of a loom which are usually secured together by bottom girts 12 and 13 and a breast beam 14. The loom side frames 10 and 11 are also connected at their upper ends by an arch connection 15 bolted to the respective side frames about midway between the front and rear ends of the frame. The loom is also provided with the usual warp beam 16 from whence warp yarns Y are drawn to a suitable take-up mechanism such as a sand roll 17, a bar 18 and a cloth take-up roll 20. In their course from the warp beam 16 to the cloth take-up mechanism, the warp yarns Y extend upwardly from the warp beam 16 and pass over vibrator roll 21 and then downwardly and beneath a whip roll 22 after which the yarns Y extend forwardly and pass through two or more harnesses, there being two harnesses shown in Figure 1 indicated as 23 and 24.

As the yarns Y extend from the whip roll 22 to the harnesses 23 and 24, they pass between a pair of horizontally disposed shafts or bars 25 and 26 which are a part of the improved set mark eliminator broadly designated at 27 and which will be later described in detail.

The yarns Y pass from the harnesses 23 and 24 through a reed 30 mounted between a reed cap and a lay 31 and 32, respectively, where the yarns Y are formed into fabric F which is wound up by the sand roll 17, bar 18 and take-up roll 20. The reed cap and lay are suitably secured, in a conventional manner, to swords 33, only one of which is shown in Figure 1. The sword 33 is fixedly mounted at its lower end on a conventional rocker shaft 34 mounted for oscillation in the loom side frames 10 and 11.

A conventional crank shaft 35 having a pair of

cranks 37 thereon is mounted in conventional bearings 40 and 41 suitably secured on the loom side frames 10 and 11 respectively. The swords 33 are pivotally connected to the front ends of pitman rods 38, the rear ends of which are connected to the cranks 37. In this particular instance, the crank shaft 35 is also shown as being rotatably mounted in bearings 43 and 44 suitably secured, as by bolts 45, on a loom girt designated broadly at 46 and including an inverted channel-shaped medial portion 47 and enlarged end portions 50 and 51, these enlarged end portions 50 and 51 being hollow to permit the cranks 37 to have movement therethrough upon rotation of the crank shaft 35. These enlarged end portions are suitably secured, as by bolts 52, to the proximate surfaces of the loom side frames 10 and 11.

The loom girt 46 is shown only as a convenient means for supporting the improved set mark eliminator since it is evident that suitable brackets may be secured to the proximate surfaces of the loom side frames 10 and 11 in lieu of the girt 46. This particular girt 46 is of a type substantially as shown and described in U. S. Patent No. 2,351,513 of June 15, 1944, issued to J. O. Hunt.

The loom also has a conventional driven harness cam shaft 55 which is mounted in a conventional manner for rotation in the loom side frames 10 and 11 and has a pair of closely spaced harness cams 56 and 57 fixedly mounted thereon. The harness cams 56 and 57 operate conventional treadles 60 and 61, respectively, pivotally mounted at their rear ends on the rear girt 13, as at 62, and which are suitably connected to the heddle frames or harnesses 23 and 24, respectively, supported on the arch connection 15 for up and down movement in a conventional manner. The parts heretofore described are to be considered as conventional parts of a loom and it is with these parts that the present invention is adapted to be associated.

It has already been stated that the warp yarns Y pass between upper and lower horizontally disposed shafts 25 and 26 which comprise the improved set mark eliminator 27. Now, both the upper and lower shafts 25 and 26 are substantially identical in structure and as to their manner of being mounted with the exception that the uppermost shaft 25 is adapted to be swung rearwardly about one of the guide posts to be presently described so the warp yarns may be readily passed above the lower shaft 26 as they are extended through the harnesses 23 and 24 and the reed 30 in setting up the loom for operation.

Each of the shafts 25 and 26 is of tubular construction and opposed ends thereof are provided with machined recesses 70 and 71 in which the outer races of respective sealed ball bearings 72 and 73 are mounted and secured therein as by a pressed fit. Although seals 74 and 75 are provided on both sides of each of the ball bearings 72 and 73 as shown in Figure 4, it is to be understood that many other types of anti-friction or friction bearings may be employed in lieu of the bearings 72 and 73, it being preferred that sealed ball bearings be employed so as to obviate the necessity for lubricating the bearings.

The inner races of the ball bearings 72 and 73 in the shafts 25 and 26 are suitably mounted, in a manner to be presently described, for rotation on vertically movable guide blocks or mandrels, the upper shaft 25 being mounted for rotation on guide blocks 80 and 81 and the lower shaft 26 being mounted for rotation on guide blocks

82 and 83. The guide blocks 82 and 83 are identical to the guide block 81 which is shown in detail in Figure 4. The guide block 80 is also substantially the same as the guide block 81 and the difference between the guide blocks 80 and 81 will be presently described. The guide blocks 81 to 83, inclusive, are preferably circular in cross section and each of the guide blocks 81, 82 and 83 has a reduced portion 85 projecting inwardly therefrom, as shown on the guide block 81 in Figure 4, and this reduced portion 85 has the inner race of the ball bearing 73 fixedly mounted thereon as by a pressed fit.

It is evident that the inner race of the ball bearing 72 associated with the shaft 26 would also be pressed onto a reduced portion of the guide block 82 which is identical to the reduced portion 85 of the guide block 81 (Figure 4). Each of the guide blocks 81 to 83, inclusive, has a suitable sleeve bearing or tubular bearing 86 secured therein, by any suitable means such as a pressed fit, this sleeve bearing 86 preferably being of a pressed fibre or plastic material although it may be of a metallic bearing material if desired. By referring to Figure 5, it will be observed that opposed ends of the bearing 86 conform substantially to the configuration of the respective guide blocks 81 to 83 inclusive.

The guide block 80 also has a vertically extending sleeve bearing or tubular bearing 88 therein which is substantially the same as each of the sleeve bearings 86 in the blocks 81 to 83, inclusive, and is secured in the guide block 80 by any suitable means such as a pressed fit. The bearings 86 in the guide blocks 81 to 83 are mounted for vertical sliding movement on a guide post 87 and the corresponding bearing 86 of the guide block 82 is mounted for vertical sliding movement on a guide post 90, the sleeve bearing 88 of the guide block 80 also being mounted for vertical sliding movement on the guide post 90.

The guide block 80 is substantially the same as the guide block 81 in that it is also provided with a reduced portion 91 on which the inner race of the corresponding ball bearing 72 is fixedly mounted as by a pressed fit. However, the front surface of the guide block 80 is flattened or cut away as at 92. The guide block 80 and the sleeve bearing have coinciding slots 93 therein which establish communication between the face 92 of the guide block 80 and the interior of the sleeve bearing 88 through which the guide post 90 extends.

Adapted to be secured against the face 92 of the guide block 80 is a closure plate or block 95 having a bore 96 therein which is loosely penetrated by a stud 97 which is threadably embedded or otherwise suitably secured in the guide block 80 and projects outwardly from the face 92. A washer 100 is then mounted on the stud 97 and is tightened against the outer or front surface of the closure block 95 by a suitable wing nut 102 which may be readily manipulated by an operator for removing the wing nut to facilitate the removal of the closure clock 95 so as to permit the guide block 80 to be moved away from the shaft 90 in a horizontal plane, the walls of the slot 93 passing by the guide post 90 and, in so doing, the upper shaft 25 is swung to and past the dotted line position shown in Figure 3, as would be the case in replacing the warp yarns Y on the loom. This closure block 95 also serves as a bearing member in that it has an inwardly projecting portion 103 integral therewith which

is shaped to conform with the curvature of the guide post 90 and which is adapted to fit snugly between the walls of the slot 93.

The lower ends of the guide posts 87 and 90 are threadably embedded and may threadably penetrate horizontal portions of angle brackets 105 and 106, respectively, which may be secured, by any suitable means such as screws 107, to the rear surface of the medial portion 47 of the girt 46, it being understood that suitable brackets may be provided in lieu of the girt 46, to which the brackets 105 and 106 may be secured and the brackets may be, in turn, suitably secured to the loom side frames 10 and 11 respectively. It will be noted that the horizontal legs of the angle brackets 105 and 106 are disposed in substantially the vertical plane of the bearing blocks 44 and 45, this being the preferred position for the posts 87 and 90 with respect to the cranks 37 on the crank shaft 35 and the loom side frames 10 and 11.

For the sake of appearance and also to insure that the guide posts 87 and 90 will remain locked in the horizontal portions of the respective angle brackets 105 and 106, suitable locking flanges 109 and 110 are threadably mounted on the lower portions of the respective posts 87 and 90, these flanges 109 and 110 being forms of spanner nuts which may be tightened against the upper surfaces of the horizontal portions of the angle brackets 105 and 106, respectively, each of the flanges 109 and 110 being provided with one or more radially extending bores 111 arranged for reception of a suitable spanner wrench or the like (Figure 5).

The lower portion of the guide posts 87 and 90 are surrounded by conically-shaped compression springs 113 and 114, respectively, the upper ends of which urge respective washers 115 and 116 against the lower surfaces of the guide blocks 83 and 82 respectively. This will, in turn, urge the guide blocks 82 and 83 toward the respective guide blocks 80 and 81 and will urge the lower shaft 26 towards the upper shaft 25. The shafts 25 and 26 are held in spaced relation to each other, at times when the warp yarns Y are leveled as shown in Figure 7, by suitable spacing washers 117 and 118 which loosely surround the guide posts 87 and 90, these washers 117 and 118 preferably being of a resilient material such as leather, rubber and the like.

The upper shaft 25 is urged towards the lower shaft 26 by suitable compression springs 121 and 122 which surround the respective shafts 87 and 90. The lower ends of the compression springs 121 and 122 bear against respective washers 123 and 124 which are mounted on the respective guide posts 87 and 90 and which, in turn, bear against the upper surfaces of the bearing or guide blocks 81 and 80 respectively. The upper ends of the compression springs 121 and 122 bear against respective collars 127 and 128 which are slidably mounted on the respective posts 87 and 90 and are secured thereon by any suitable means such as set screws 129, only one of which is shown in Figure 5.

Loosely mounted on the guide posts 87 and 90 and spanning the distance therebetween is a reinforcing plate or bar 130 which rests on the upper surfaces of the collars 127 and 128 and is held in position thereagainst by nuts 131 and 132 threadably mounted on the upper ends of the respective guide posts 87 and 90. The purpose of the reinforcing bar 130 is to lend rigidity to the upper portions of the guide posts 87 and 90 and to hold the upper ends thereof in correctly spaced relation relative to the lower ends thereof.

It will be observed in Figure 1 that the shafts 25 and 26 of the warp tension set mark eliminator are disposed between the harnesses and the junction point of the warp yarns which extend through the upper and lower harnesses when they are in a staggered position with respect to each other as in Figure 1. This point is usually the position occupied by the usual type of electrical or mechanical stop motion, not shown, for stopping the loom in the event of any of the warp yarns being broken or severed.

Now, in the event of the loom having been stopped, it is well known to those familiar with the art that the warp yarns Y sag intermediate the points at which they are supported, such as between the vibrating whip roll 21 and the beat-up point of the reed 30. Therefore, upon the loom being started and with the initial and immediately subsequent beat-up strokes of the lay 32, the slack previously caused in the warp yarns Y due to their having sagged between the fabric and the vibrating whip roll 21, will be taken up upon these initial beat-up strokes of the lay 32 thus causing ridges or places in the fabric of uneven density, commonly termed set marks, thus resulting in an imperfect finished fabric. Now, the object of the present set mark eliminator is to create tension on the warp yarns between their points of suspension simultaneously with the initial as well as subsequent beat-up strokes of the lay 32 upon the loom being started.

Referring to Figure 7, the harnesses 23 and 24 are shown in a substantially level position, during which the rolls or shafts 25 and 26 are urged to an optimum position with respect to each other by the compression springs 113, 114, 121 and 122, and in which instance the guide blocks 81 and 82 are urged into engagement with opposed surfaces of the spacing washer 117 and the guide blocks 80 and 82 are urged into engagement with opposed surfaces of the spacing washer 118.

However, upon a shed being formed of the warp yarns or movement of the harnesses 23 and 24 from, say, the position shown in Figure 7 to the position shown in Figure 1, the warp yarns Y which pass through one of the harnesses, will be urged upwardly against the lower surface of the upper shaft 25 and the warp yarns Y which are carried by the other of the harnesses will be moved downwardly to urge the lower shaft 26 downwardly thus moving the shafts 25 and 26 from the position shown in Figure 7 to substantially the position shown in Figures 1 and 2.

It is evident that the less sag which had occurred in the warp yarns Y during periods of inoperation of the loom, the further apart the upper and lower shafts 25 and 26 would be moved by the warp yarns Y upon a shed being formed by the harnesses 23 and 24. As the harnesses 23 and 24 move to a staggered position with respect to each other in forming a shed of the warp yarns Y, the pressure of the upper and lower shafts 25 and 26 will cause the warp yarns Y to slide backwardly or away from the beat-up point of the reed 30 in Figure 1 through the harnesses 23 and 24 thus insuring that the warp yarns will be taut between the harnesses 23 and 24 and the beat-up point of the reed 30 upon the loom being started. It is thus seen that the warp yarns Y will be taut upon each beat-up stroke of the lay 32 at all times although the loom may have been stopped for a considerable length of time before again being started.

In the drawings and specification, there has been set forth a preferred embodiment of the invention and although specific terms are employed, they are used in a descriptive and generic sense only, and are not for purposes of limitation, the scope of the invention being defined in claims.

I claim:

1. In a loom having a lay and also having cloth take-up means adjacent the lay and also having a whip roll and also having a warp beam and warp yarns directed from the warp beam to the whip roll and to the cloth take-up and said loom also having harnesses mounted for up and down movement therein with respect to each other and through which the warp yarns pass in their course from the whip roll to the lay and said harnesses being adapted to form a shed of the warp yarns upon relative movement of the harnesses, an improved warp tension set mark eliminator comprising a pair of horizontally disposed and transversely extending shafts disposed in closely spaced relation, one above the other, rearwardly of the harnesses and between which the warp yarns pass in their course from the whip roll to the harnesses, said rolls being resiliently mounted and being positioned at a point between the point from which the shed formed by the harnesses originates and the harnesses to thus create pressure on opposed surfaces of the warp yarns upon a shed being formed to tighten the warp yarns between the beat-up point of the lay and the harnesses.

2. In a loom having a cloth take-up mechanism and also having an oscillatable lay and also having relatively movable harnesses and also having a plurality of warp yarns extending through said harnesses and to the lay to be beat up into cloth upon each beat-up stroke of the lay and also having means for supporting the warp yarns a substantial distance rearwardly of the harnesses and said harnesses being adapted to form a shed of the warp yarns upon relative movement of said harnesses, an improved set mark eliminator comprising a pair of vertically spaced horizontally disposed shafts extending transversely of the loom and between which the warp yarns extend from their point of suspension rearwardly of the loom to the harnesses, spring means urging said shafts towards each other to where they will be disposed in close proximity to each other when the harnesses and the warp yarns are leveled and said shafts being so positioned that upon a shed being formed of the warp yarns, said shed will extend from the harnesses rearwardly beyond the vertical plane of the shafts, whereby the shafts will resiliently engage the opposed or remote surfaces of the warp yarns forming said shed to cause a tension to be applied to said warp yarns to prevent the occurrence of set marks upon initial beat-up strokes of the lay upon starting the loom.

3. In a loom having an oscillatable lay and also having a plurality of relatively vertically movable harnesses and also having means for supporting a plurality of warp yarns at a point substantially in advance of the harnesses and said warp yarns extending through the harnesses to the lay to be woven into fabric, an improved set mark eliminator comprising a pair of spring pressed shafts disposed one above the other and between which the warp yarns pass in their course from the point at which they are supported in advance of said harnesses to the harnesses, said shafts being spring pressed towards each other and being positioned closely adjacent the harnesses whereby, upon a shed being formed of the warp yarns by the said harnesses, the warp yarns will tend to urge the shafts apart from each other thereby creating additional tension in the warp yarns between the beat-up point of the lay and through the harnesses to the shafts to thus insure that the warp yarns are taut upon each beat-up stroke of the lay upon the loom being started after having been idle.

4. In a structure according to claim 3, means for supporting said shafts for vertical movement relative to each other comprising a pair of spaced vertically disposed guide posts, means on the loom for supporting said guide posts in fixed relation thereto, a pair of superposed guide blocks mounted for vertical sliding movement on each guide post, means supporting opposed ends of the shafts for rotation on the respective guide blocks on the guide posts and spring means normally urging the guide blocks on each of the said guide posts towards each other.

5. In a loom having an oscillatable lay and also having cloth take-up means adjacent the lay and also having a plurality of relatively vertically movable harnesses and through which a plurality of warp yarns are adapted to pass to the lay and also having means for supporting the warp yarns substantially in advance of the harnesses, an improved set mark eliminator comprising means resiliently engaging the upper and lower surfaces of the warp yarns adjacent and in advance of the harnesses whereby, upon a shed being formed through relative movement of said harnesses, said shed will extend between the resilient means to thereby create additional tension on the warp yarns between said resilient means and the beat-up point of the lay upon each stroke thereof to eliminate slackness of the warp yarns.

6. In a loom having an oscillatable lay and also having cloth take-up means adjacent the lay and also having a plurality of relatively vertically movable harnesses and through which a plurality of warp yarns are adapted to pass to the lay and also having means for supporting the warp yarns substantially in advance of the harnesses, an improved set mark eliminator comprising means resiliently engaging the upper and lower surfaces of the warp yarns adjacent and in advance of the harnesses whereby, upon a shed being formed through relative movement of said harnesses, said shed will extend between the resilient means to thereby create additional tension on the warp yarns between said resilient means and the beat-up point of the lay upon each stroke thereof to eliminate slackness of the warp yarns, said resilient means comprising a pair of vertically spaced transversely extending horizontally disposed shafts, a pair of transversely spaced vertically disposed guide posts mounted in fixed relation to the loom, a pair of superposed vertically movable guide blocks mounted on each of said guide posts, each of said guide blocks having an inwardly projecting portion thereon of less diameter than the diameter of said shafts, said shafts being mounted for rotation on said inwardly projecting portions of the corresponding guide blocks and spring means normally urging the guide blocks towards each other to, in turn, urge the shafts towards each other to create a tension on the warp yarns upon a shed being formed thereby.

7. In a structure according to claim 6, means on at least one of the guide blocks associated with the uppermost of said shafts to allow its re-

moval from the corresponding guide post in a line transversely of the guide post so as to permit the uppermost shaft to be swung substantially out of the vertical plane of the lower shaft for purposes of replacement of said warp yarns.

8. In a loom having an oscillatable lay and also having cloth take-up means adjacent the lay and also having a plurality of relatively vertically movable harnesses and through which a plurality of warp yarns are adapted to pass to the lay and also having means for supporting the warp yarns substantially in advance of the harnesses, an improved set mark eliminator comprising means resiliently engaging the upper and lower surfaces of the warp yarns adjacent and in advance of the harnesses whereby, upon a shed being formed through relative movement of said harnesses, said shed will extend between the resilient means to thereby create additional tension on the warp yarns between said resilient means and the beat-up point of the lay upon each stroke thereof to eliminate slackness of the warp yarns, said resilient means comprising a pair of vertically spaced transversely extending horizontally disposed shafts, a pair of transversely spaced vertically disposed guide posts mounted in fixed relation to the loom, a pair of superposed vertically movable guide blocks mounted on each of said guide posts, each of said guide blocks having an inwardly projecting portion thereon of less diameter than the diameter of said shafts, said shafts being mounted for rotation on said inwardly projecting portions of the corresponding guide blocks and spring means normally urging the guide blocks towards each other, to in turn, urge the shafts towards each other to create tension on the warp yarns upon a shed being formed thereby, a reinforcing bar

disposed substantially above the uppermost tubular shafts and being fixed at opposed ends thereof to said guide posts for lending rigidity thereto.

9. In a loom having an oscillatable lay and also having cloth take-up means adjacent the lay and also having a plurality of relatively vertically movable harnesses and through which a plurality of warp yarns are adapted to pass to the lay and also having means for supporting the warp yarns substantially in advance of the harnesses, and improved set mark eliminator comprising a pair of transversely disposed members disposed adjacent said harnesses and between which the warp yarns are adapted to pass in their course from the means supporting the same in advance of the harnesses and the beat-up point of the lay, one of said members being normally biased to move upwardly towards the lower surfaces of said warp yarns and the other of said members being normally biased to move downwardly against the upper surfaces of said yarns to thus create a further tension on said yarns at times when a shed is formed by said harnesses as compared to said harnesses being in a substantially level position relative to each other.

GEORGE F. BAHAN.

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