S. TOYODA.

ARRANGEMENT FOR TENSION AND LET-OFF OF WARPS.

APPLICATION FILED SEPT. 25, 1907.

917,682. Patented Apr. 6, 1909.

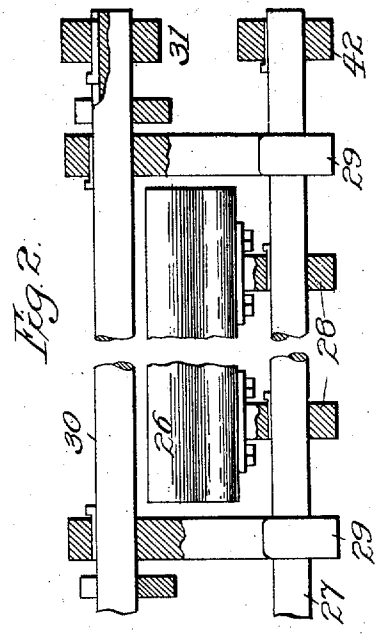


Fig. 2.

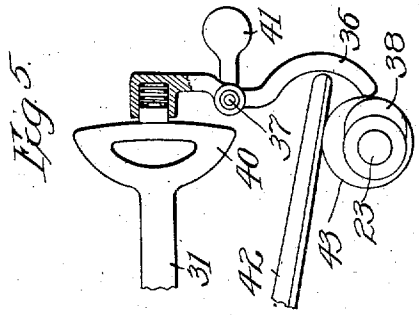


Fig. 5.

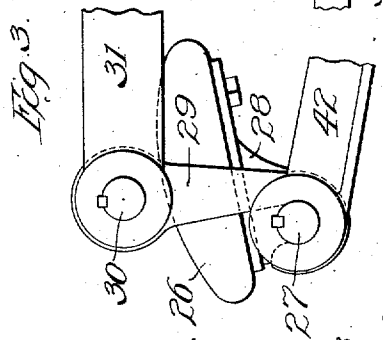


Fig. 3.

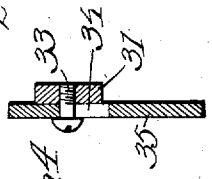


Fig. 4.

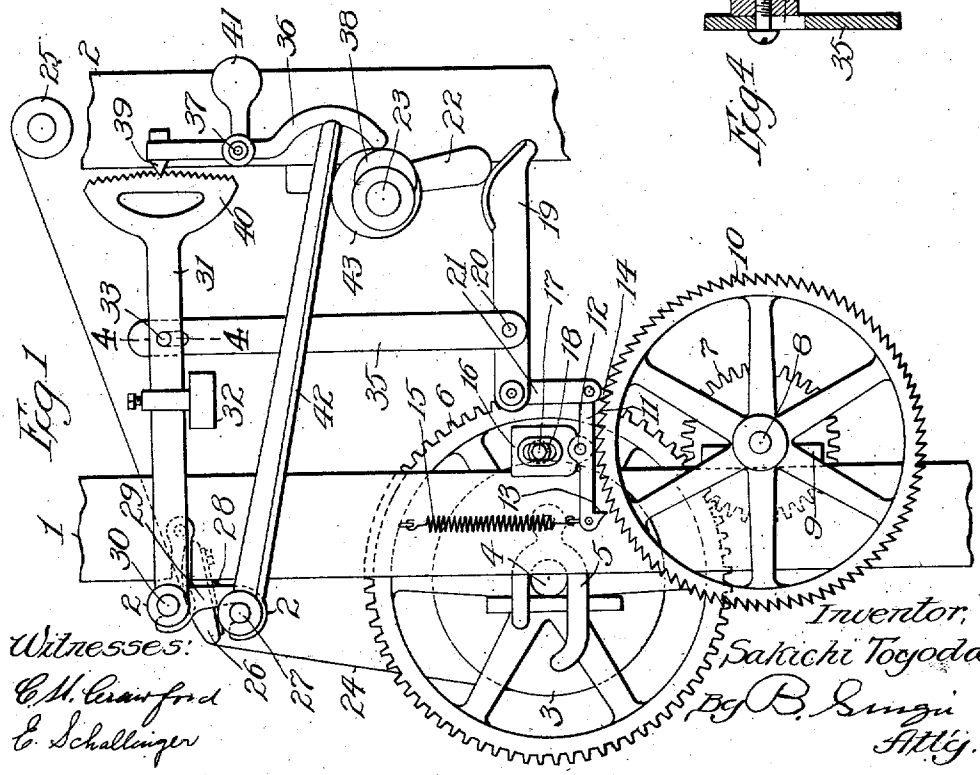


Fig. 1.

Witnesses:
C. M. Crawford
E. Schallinger

Inventor,
Sakichi Toyoda,
By B. Singer
Atty.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SAKICHI TOYODA, OF SHIMASAKI-CHO, NAGOYA, JAPAN.

ARRANGEMENT FOR TENSION AND LET-OFF OF WARPS.

No. 917,682. Specification of Letters Patent. Patented April 6, 1909.

Application filed September 25, 1907. Serial No. 394,542.

To all whom it may concern:

Be it known that I, SAKICHI TOYODA, a subject of the Emperor of Japan, residing at Shimasaki-Cho, Nagoya, in the Empire of Japan, have invented certain new and useful Improvements in Arrangements for Tension and Let-Off of Warps, of which the following is a specification.

This invention relates to improvements in tension and let-off devices for looms and has for its primary object the general reduction of tension usually applied to the warp threads with a view of reducing the frequency of thread breakage and avoiding the time lost and trouble caused and generally increasing the efficiency and improving the product.

One of the principal objects is to provide an automatic tension device adapted normally to maintain a pre-determined amount of tension on the warp and operatively associated with a let-off device so as to automatically control the warp beam in accordance with the tension adjustment or application of tension to the warp threads.

A further novel feature consists in the provision of improved means for locking the tension device, at predetermined times such for instance as when the weft is beat up by the reed, for the purpose not only of preserving the effected adjustment but also preventing vibration and oscillation of the tension device due to the beat up of the weft.

A further novel feature consists in the provision of means for automatically effecting desired tension of the warp when the shed is closed and preferably during the beating up operation.

Other novel features of the invention will be more fully described in connection with the accompanying drawings and will be more particularly pointed out and ascertained in and by the appended claims.

In the drawings, Figure 1 is a view in side elevation of a machine embodying the main features of my invention. Fig. 2 is a front view partly in elevation and partly in section taken on line 2—2 of Fig. 1. Fig. 3 is an enlarged detail view of parts shown in Fig. 2. Fig. 4 is a sectional view on line 4—4 of Fig. 1. Fig. 5 illustrates a modified construction of a device for locking the tension lever.

Like numerals of reference designate similar parts throughout the different figures of the drawings.

The device of my invention will now be described in detail in connection with the specific embodiment shown but it will be understood that I do not wish to be limited by such specific disclosure except for such limitations as the claims import.

As shown a portion of the frame of a loom is illustrated consisting of members 1 and 2. The warp beam 3 is mounted upon a spindle 4 conveniently supported upon frame member 1 by a bearing such for instance as indicated by 5. The spindle 4 is provided with a gear wheel 6, preferably located inside the frame member 1, and meshing with a gear wheel 7 mounted on a shaft 8 also supported on frame member 1 in suitable bearings such for instance as indicated at 9. The foregoing parts comprise specifically the means whereby the warp beam is operatively related with the improved let-off which will now be described in detail.

A ratchet wheel 10, preferably mounted on shaft 8, is controlled by means of a ratchet or escapement mechanism which as shown comprises a lever 11, pivotally mounted at 12 and provided with pallets or pawls 13 and 14. Said pawls operate substantially the same as the pallets of an escapement lever in a watch movement, the pawl 14 serving to lock the wheel 10 and the pawl 13 serving to retain it and restrict its movement during the period intervening the release and reëngagement of the pawl 14 with said wheel. A spring 15 secured to the lever 11 at one end and to any suitable stationary part at its other end serves normally to maintain the lever in the position shown in Fig. 1. An adjustable mounting is desirably provided for the lever 11 in order to regulate the position of the same with respect to the wheel 10 to insure efficient operation of the ratchet mechanism and as shown such mounting consists of a plate 16, which carries the pin 12, and which is adjustably secured by means of a bolt 17 to a suitable form of bracket 18 projecting from the frame member 1 or like stationary part. The lever 11 is provided with operating means which as shown consists of a lever 19, pivotally mounted between its ends at 20, and connected by a link 21 with the lever 11. At its outer free end said arm 19 is adapted for engagement with means preferably in the form of an arm 22 mounted upon a controlling shaft 23 which arm serves when rotating to rock the lever 19 upon its pivot

20 and operate the lever 11 to permit step by step movement of the wheel 10 by means of which a gradual let-off of the warp is effected.

The improved tension device which is preferably associated with the let-off mechanism in a manner to control the operation thereof will now be described in detail.

The warp 24 passing from the warp beam 3 to the cloth beam 25 is trained over a tightener which as shown consists of a saddle 26 movably mounted in such a manner that when it is moved or adjusted in one position it serves to slack the warp threads and when adjusted to another position serves to tighten or tension the same. As shown however the improved tightener is adapted to be operated upon by the warp threads to perform its function in one capacity and is adapted to be operated by mechanism to be hereinafter described to perform its function in another capacity. First describing the tightener in connection with devices adapted to be operated thereby through the action of the warp threads the same is mounted upon a shaft 27 by means of brackets 28 which as shown are secured to the bottom portions of the saddle and are keyed to the shaft 27. Said shaft 27 is removably mounted in hook shaped hangers 29 keyed to and suspended from a rock-shaft 30. A tension arm 31 is keyed to shaft 30 and extends rearwardly therefrom preferably in a horizontal plane and is provided with a weight 32 adapted to be adjustably secured to any desired position on said arm. It will be obvious from the drawings that when the warps 24 are tightened owing to continuous rotation of the cloth beam 25 they will bear down upon the saddle 26 and cause the hangers 29 to move rearwardly and thereby effect rocking movement of the shaft 30 in a contra-clockwise direction which movement will serve to raise the arm 31. The position of the weight 32 will obviously control the movements of the parts and determine the tension applied to the warp threads. When the warp threads become slack the weight 32 will rock the shaft 30 in a clockwise direction restoring the saddle 26 to a normal position and thereby serving to take up the slack as fast as it forms. It will be understood that as the cloth beam 25 rotates it will be necessary to let-off the warp from the beam 3 and to this end the arm 31 is operatively associated with the let-off mechanism as follows. A pin 33 desirably carried by the arm 31 engages a slot 34 formed in a link 35 which is connected at 20 with the lever 19. When the warp threads 24 are taut and it is necessary to pay out from the warp beam as shown in Fig. 1 the pin 33 will occupy an extreme upward position in the slot 34 and the lever 19 will be oscillated by the arm 22 about the pivot 20 as a fixed center so that when the outer end of the lever 19 is depressed the pawl 14 will be lifted out of engagement with the ratchet wheel 10 and the latter will be intermittently rotated the space of a tooth. When however the payout from the warp beam slackens the warp and the arm 31 swings downwardly the pin 33 will occupy a lowermost position in the slot 34 and no movement will be imparted to the lever 19 by the arm 22 until the warp beam 25 again takes up the slack whereupon the foregoing operations will be repeated.

In order to prevent oscillation and vibration of the arm 31 during the beat up of the weft by the reed and thereby avoid straining and possibly breaking the warp threads as the result of such vibration means are provided for locking the arm 31 in whatever position it may assume during the beat-up of the reed and releasing said arm immediately after the reed has been retracted from its beating-up to its normal position. As shown said means consists of a lever 36 pivotally mounted at 37 between its ends and adapted at one end to be operated by a cam 38 on the controlling shaft 23 and carrying at its other end a removably mounted projection 39 adapted for engagement with a rack 40 formed on the arm 31. A weight 41 or equivalent means may serve to normally maintain the lever 36 in engagement with the cam 38 and out of engagement with the rack 40. The cam 38 is so timed with respect to the reed as to lock the arm 31 when the reed is beating-up the weft. Immediately after the weft is beat-up and the shed is closed by the harness the warp threads become suddenly slackened by reason of the closing of the shed and at such time it is desirable to take up the slack and for this function separate mechanism is provided which as shown consists of the following construction. A lever 42 is keyed on the shaft 27 carrying the tightener and which shaft is loosely mounted in the hangers 29 and said lever bears at its opposite end upon a cam 43 mounted on the controlling shaft 23. The cam 43 is so timed with respect to the harness that when the shed is closed it will raise the free end of the lever 42 and act therethrough to take up the slack in the warp 24 by movement of the saddle 26 which is keyed to the shaft 27.

It will be seen from the foregoing that the tension device includes two elements namely the tightener 26 and the arm 21 and that these two elements are movable with respect to each other so that when the arm 31 is locked the arm 42 which will be termed auxiliary mechanism may serve to act upon the tightener 26 when the arm 31 is locked although it will be understood that the invention is not to be limited to a tension device including two elements one movable with respect to each other. It will

further be obvious that the let-off mechanism is controlled by the tension device although it will be clear that the invention may be realized by otherwise controlling said let-off device.

I claim:—

1. A loom comprising in combination, a tension device composed of a tightener over which the warp is trained, a shaft upon which said tightener is mounted, a rock-shaft, hangers keyed to said rock-shaft and supporting said tightener shaft, a weighted arm keyed to said rock-shaft, an arm keyed to said tightener shaft, a cam for operating said last mentioned arm, and a let-off device controlled by said first mentioned arm.

2. A loom comprising in combination, a warp beam, a let off mechanism including a ratchet wheel operatively connected with said beam, an escapement lever acting on said wheel, a continuously rotating escapement actuating member, an element connected with said escapement lever, and a warp tensioning device for throwing said element into and out of operative relation with said member to effect and prevent operation of said escapement lever.

3. A loom comprising in combination, a warp beam, a let off mechanism including a ratchet wheel operatively connected with said beam, an escapement lever acting on said ratchet wheel, a continuously rotating escapement actuating member, an arm connected with said escapement lever, a link supporting said arm, and a tensioning device loosely connected with said link and serving when the warp is tensioned to raise said arm in coöperative relation with said actuating member and permitting said arm to descend out of operative relation with said member when the warp is slack.

4. A loom comprising in combination, a tension device comprising a tightener over which the warp is trained, a shaft upon which said tightener is rigidly mounted, a rock shaft, hangers keyed to said rock shaft and loosely supporting said tightening shaft, a weighted arm rigidly secured to said rock shaft, and means for operating said tightener shaft to tension the warp when the shed is closed.

In testimony whereof I affix my signature in presence of two witnesses.

SAKICHI TOYODA.

Witnesses:

UHACHI ISHIWARAY,

GENJI KURIBARA.