March 27, 1928. **1,663,923**

J. R. SHUTT

WARP BEAM

Filed Feb. 25, 1927

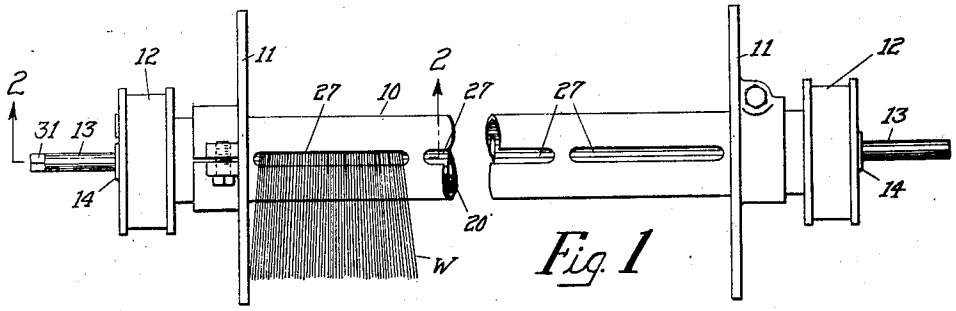


Fig. 1

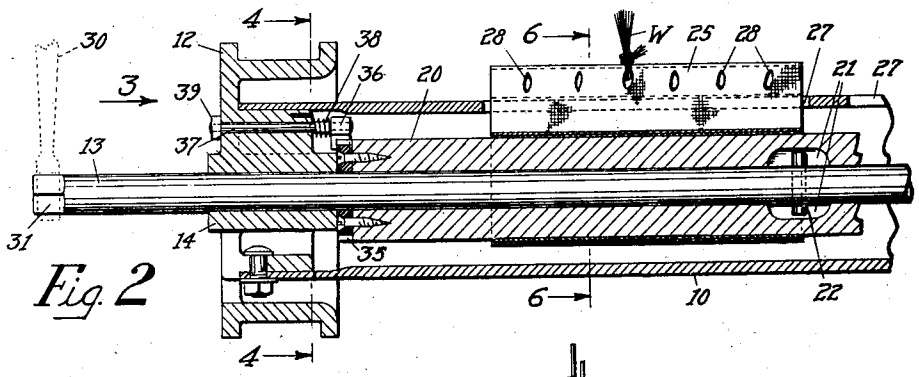


Fig. 2

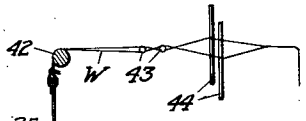


Fig. 7

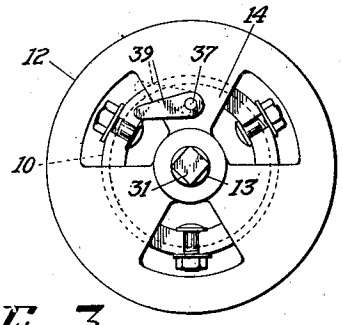


Fig. 3

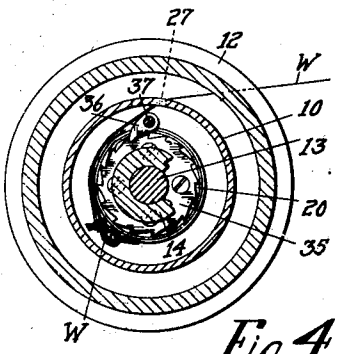


Fig. 4

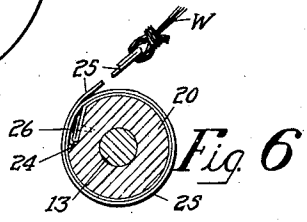


Fig. 6

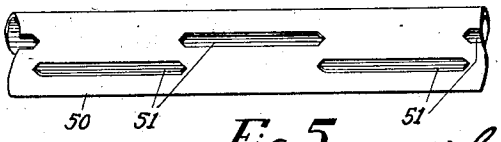


Fig. 5

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UNITED STATES PATENT OFFICE.

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WARP BEAM.

Application filed February 25, 1927. Serial No. 170,984.

This invention relates to a warp beam capable of general use, but particularly designed for silk looms and for other looms using very fine warp. In such looms it is found that any slight irregularity in the contour of the warp beam or any unevenness caused by the means for attaching the warp thereto will produce defects in the cloth, which are readily apparent in the finished fabric.

It is the general object of my invention to provide a warp beam having an improved construction for attaching the ends of the warp threads thereto. A further object is to provide means by the use of which the warp threads may be woven to a point substantially closer to the end of the warp, thus reducing the warp waste.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings in which

Fig. 1 is a side elevation of my improved warp beam;

Fig. 2 is an enlarged partial sectional view, taken along the line 2—2 in Fig. 1;

Fig. 3 is an end view, looking in the direction of the arrow 3 in Fig. 2;

Fig. 4 is a sectional end elevation, taken along the line 4—4 in Fig. 2;

Fig. 5 is a partial side elevation of a slight modification;

Fig. 6 is a transverse sectional view, taken along the line 6—6 in Fig. 2; and

Fig. 7 is a diagrammatic view illustrating the utility of my invention.

Referring to the drawings I have shown a warp beam comprising a tubular barrel 10 having beam heads 11 clamped thereon and preferably adjustable to vary the width of the warp. Friction pulleys 12 are mounted loosely on the beam shaft 13 and are provided with hubs 14 to receive and center the ends of the barrel 10. A rope or belt (not shown) encircles each friction pulley 12 and is provided with a weight or other means for applying the desired tension thereto.

A roll or drum 20 is mounted on the beam shaft 13 and is provided with slots 21 to receive a cross pin 22 in the shaft 13 by which the roll may be turned angularly. Any other suitable means for securing the roll to the shaft may be substituted.

The roll 20 is grooved or cut away longitudinally, as indicated at 24 in Fig. 6, and a canvas or otherwise flexible apron 25 is secured to the roll 20 in any convenient manner, as by passing screws 26 through a doubled portion at the end of the fabric to secure it to the roll in the cut-away portion 24.

The apron 25 is preferably subdivided into a series of relatively narrow strips, mounted side by side along the barrel 20, each strip being adapted to be pulled outward through a slot 27 (Fig. 1) in the side of the tubular barrel 10. The outer end portion of each strip of the apron 25 may be provided with eyelets 28 into which the ends of the warp threads W may be knotted.

After the warp threads have been thus attached to the apron, a wrench or handle 30 (Fig. 2) may be applied to the squared end 31 of the beam shaft 13 and the shaft may be rotated to wind the apron around the roll 20, drawing the same gradually inward until the end of the fabric apron 25 and the portions of the warp threads knotted thereto have been drawn inside of the outer barrel 10, as indicated in Fig. 4.

In order to hold the roll in this position, a ratchet plate 35 is secured to the end of the roll 20 and a holding pawl 36 is mounted on a rod 37 rotatable in a bearing in one of the heads 12. A spring 38 is mounted on the rod 37 and causes the pawl 36 to yieldingly engage the ratchet plate as indicated in Fig. 4. A handle 39 is secured to the outer end of the rod 37 and constitutes means by which the pawl 36 may be lifted to inoperative position for a purpose to be described.

The pawl 36 is first released and moved from holding position by the handle 37, and the canvas strips 25 are then unwound by the handle 30 and are pulled out through the elongated slots 27. The ends of the strips are then in convenient position for knotting the warp threads thereto. After all of the warp threads have been secured to the strips 25, the beam shaft 13 is rotated by the handle 30 to turn the roll within the tubular barrel 10 and to draw the strips 25 with their attached warp through the slots 27 until the knots are well within the barrel 10, as indicated in Fig. 4.

The regular winding of the warp may then proceed and it will be noted that the tendency of the warp threads to "fan out" will

cause them to be substantially equally spaced longitudinally of the warp beam at the points where they pass through the slots 27.

During the winding of the warp beam and the subsequent weaving off of the greater portion of the warp, the canvas strips and the knots of warp are retained within the barrel 10, which presents a smooth and substantially continuous outer surface on which to wind the warp, with no projections or unequalities caused by any attaching devices.

When the last end of the warp is reached the weaver will raise the pawl 36 and pull out enough of the fabric strips 25 so that the strips will nearly reach to the first guide-roll 42 (Fig. 7) over which the warp threads pass on their way to the lease-rods 43 and harnesses 44. The pawl 36 is then released to reestablish normal relations between roll 20 and friction pulleys 12, after which the pulleys are given a reverse movement sufficient to restore the original tension of the warp. During this reverse movement the fabric 25 will be wound on the tubular barrel 10 as suggested in Fig. 7 instead of on roll 20. Thereafter weaving will continue until the parts assume the position shown in Fig. 7, thus permitting the use of a part of the warp which would otherwise be wasted.

It will further be noticed that there are no attaching devices whatever outside of the warp beam barrel when the device is in normal operation and that the warp threads of silk or other fine material lay smoothly thereon and may be drawn therefrom without producing irregularities in the fabric.

There is, however, a very slight difference in the circumference of the warp beam measured around the beam and across one of the slots 27 when compared with the distance measured around the uninterrupted surface between the adjacent slots 27. The very slight difference between the chord and the arc is sufficient to vary the tension of the warp threads when a great number of fine layers are superposed.

When extreme accuracy is desired, slots 50 (Fig. 5) in the barrel 51 are provided in a staggered relation in the barrel, with the ends of adjacent slots slightly overlapping and preferably of substantially triangular shape, as shown in Fig. 5. With this construction, it will be seen that the amount of slot or opening crossed by each and every warp thread is uniform and always equal to the full width of a single slot, so that variations in warp length are avoided. Under ordinary conditions, the form of my invention first described is sufficiently accurate.

Not infrequently it occurs that the fabric to be woven is narrower than the space between the opposite ends of the apron, but this will occasion no inconvenience. The groups of warp ends will be tied to the aprons as usual and the latter drawn into the hollow barrel, after which the heads 11 will be moved in to provide the correct warp space, not being interfered with by the portions of the apron which extend beyond the warp space.

Having described my invention and the advantages thereof, it will be seen that I have provided a warp beam construction by which much improved results may be obtained in the weaving of silk or rayon and other fine fabrics, and it will be apparent that modifications may be made therein by those skilled in the art without departing from the scope of the invention as set forth in the claims. I do not wish to be otherwise limited to the details herein disclosed, but what I claim is:—

1. A warp beam having a tubular outer barrel with an axially extended opening therein, a winding member rotatably mounted within said barrel, a flexible warp-attaching member secured to said winding member and adapted to be drawn thereby through said opening and within said tubular barrel, manually operated means to turn said winding member within said tubular barrel, a pawl and ratchet mechanism within said outer barrel effective to hold said member from movement in an unwinding direction but permitting free movement in a winding direction, and means external of said barrel for releasing said pawl.

2. A warp beam having a tubular outer barrel provided with a series of axially extended slots separated by narrow supporting portions, a winding member rotatably mounted within said barrel, and a flexible warp-attaching device secured to said winding member and comprising a series of separate strips, each strip extending through one of said slots and adapted to be drawn therethrough by said winding member.

3. In a warp beam, a hollow barrel presenting a primary winding surface for the warp, flexible attaching means for the warp, a roll located within the barrel and presenting a secondary winding surface for the flexible member, the winding surface of the roll being spaced from the inner cylindrical surface of the barrel, and beam heads movable along the primary surface to vary the width of the warp space, the space between the secondary winding surface and adjacent portions of the barrel being sufficiently large to receive those portions of the flexible member which lie beyond the warp space between the beam heads.

In testimony whereof I have hereunto affixed my signature.

JESSE RAYMOND SHUTT