Jan. 24, 1928.

1,656,897

A. BALTHASAR

WARP BEAM

Filed March 29, 1923

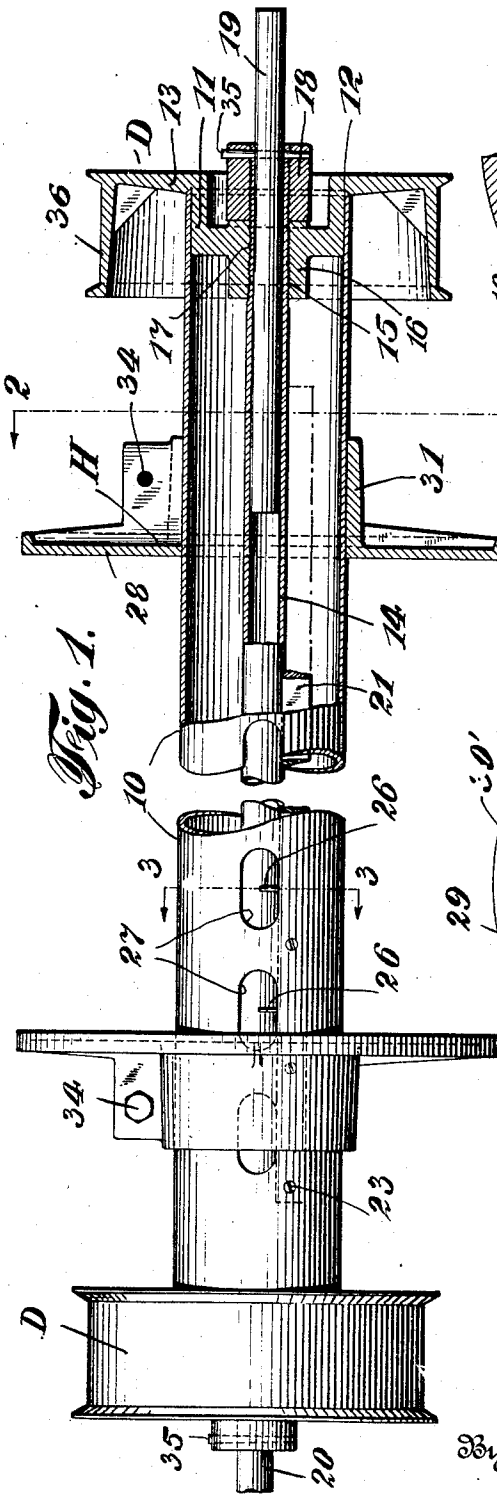


Fig. 1.

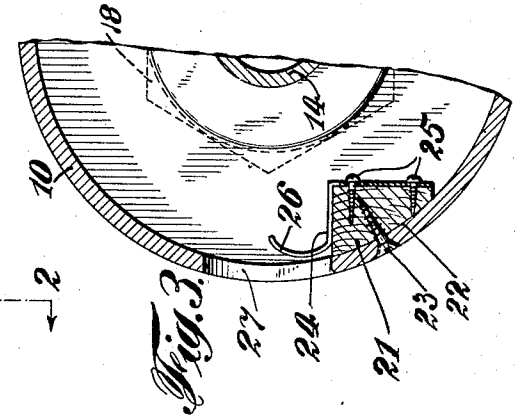


Fig. 3.

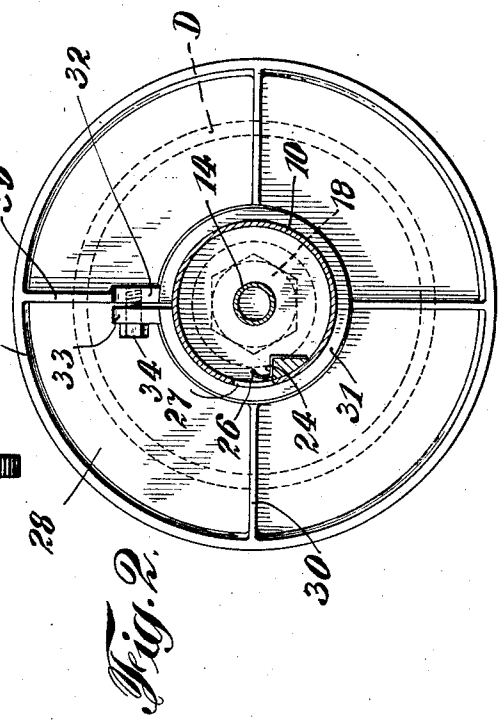


Fig. 2.

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UNITED STATES PATENT OFFICE.

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WARP BEAM.

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My present invention relates more particularly to supply reels of the type known as warp beams, although certain features of the invention are applicable in other relations.

In some respects the invention is related to my prior Patent No. 1,416,931, granted May 23, 1922. For instance, my present invention has among its objects to provide a warp beam with readily adjustable heads having such true and accurate fit upon the roll and the roll itself being so accurate, that the heads have their plane, warp retaining surfaces always parallel with each other and at right angles to the axis of the roll, without the necessity of truing them as a part of the adjusting operation; also so that the seam at the sliding joint between the head and roll is so fine as to preclude the possibility of having fibres of the warp thread become caught therein.

In prior devices of this type, the roll of the warp beam has usually been made of light, well seasoned, carefully selected wood; but, however carefully selected, wood rolls become warped on the surface; also they sag so that the heads thereof, though at right angles to the axis of the beam at the point where they are secured, are yet not parallel with each other, and the surface of the roll, being no longer a true cylinder, wobbles or has an undulating motion when rotated, thereby alternately increasing and relaxing the tension on the warp threads as they are being wound on, or drawn off the beam. In order to avoid these difficulties my invention includes providing a relatively thin-walled metal tube and preferably a steel boiler tube which obviously, from the mode of manufacture, will be of strictly accurate and uniform diameter both internally and externally from end to end, and which being hollow and thin-walled is comparatively light. Moreover, the final gross weight of my beam when loaded with warp thread may be approximately the same as that of the old wooden beams that were wound with paper to hold the warp threads in place.

Another feature of my invention is having the adjustable "loom heads" telescoped over the metallic roll, the inner circumference of the loom heads being true cylinders snugly fitting the roll. The roll being of metal from end to end, the loom heads may be provided with integral split clamping hubs which can be drawn together to tightly grip the roll at any part of the length thereof, and without any danger of injury thereto.

Another feature of the invention is the attachment of the drums at the ends of the roll, by tension bolt means extending axially through the roll and serving concurrently as means for mounting the arbors. In a preferred specific construction, the bolt comprises a length of hollow steel tube of small gauge extending axially through and having screw thread engagement with the end drums. The hubs of the latter have each an annular groove, the inwardly presented wall of which is conical concave to fit the conical-convex edge of the roll. Screwing the drums inward puts the bolt tube under tension and concurrently puts the roll under compression.

Another feature is the use of anchoring hooks for the warp threads rigidly fixed within the interior of the metal roll, said hooks being preferably attached at uniform intervals to a bar or cleat fixed in the interior of the hollow roll and freely accessible for mounting and demounting of the warp threads through corresponding openings arranged longitudinally of the roll.

The above and other objects of my invention may be more fully understood from the following description in connection with the drawings, in which—

Fig. 1 is a view in elevation of a complete warp beam partly in section,

Fig. 2 is a sectional view taken along the line 2—2, Fig. 1, and

Fig. 3 is a fragmentary sectional view taken along the line 3—3, Fig. 1.

Similar reference characters refer to similar parts throughout the several views of the drawings.

In Fig. 1 of the drawings, the various parts at the ends of the roll are shown in substantially true proportions and the actual sizes of the parts for one type of warp beam may be scaled from the diameter of the heads, which in this particular case, measures between 9 and 10 inches. In the drawing, all of the central portion of the roll which may be very long, is broken away, the portion not shown being a continuation of and identical with the portions that are shown on either side thereof.

The beam comprises a hollow cylindrical metal tube 10 preferably a relatively large-gauge steel boiler tube, which as will fol-

low as a necessary consequence from the mode of manufacture, is of strictly uniform external and internal diameter from end to end. Preferably its diameter is about 4 inches and the thickness of its walls about ⅛ inch.

Fitted at the ends of the tube 10 are drums D, each preferably comprising a hub 11 telescoped snugly into the roll and having an annular groove 12 at the inner side of its end face 13, having an inwardly directed cone face for snugly engaging a corresponding outwardly directed cone face formed on the end of the roll 10. The drums D may be secured or fixed with respect to the roll by tension bolt means extending longitudinally through the drum. In the preferred embodiment, this bolt means comprises a hollow metallic tube 14, which may be a length of steel boiler tube extending axially through the length of the roll and through axial bores 15 in the hubs 11 of the drums. The hubs are preferably elongated as at 16 to more securely engage the tube 14 to which they are threaded together as at 17. In assembly, after one of the drums D is threaded onto the end of the tension bolt 14, the latter is inserted through the roll 10, which is telescoped at one end over the drum hub. The opposite drum is thereupon threaded onto the opposite end of the tension bolt, concurrently telescoping into the corresponding end of the roll. Lock nuts 18 at opposite ends are threaded upon the free protruding ends of the bolt and a taper pin 35 is inserted to rigidly secure together parts 19, 14 and 18. It will be seen that as the drums are tightened, the central bolt 14 is placed under tension, while the roll is concurrently placed under compression, forcing the cone engaging surfaces to accurate fit and thereby centering and truing both of them. By making the radial stress on the cone surface take effect outwardly on the drum groove and inwardly on the roll wall, much greater stress can be applied without possibility of splitting the roll end. Where two or more non-axial clamping bolts are provided, not only does the assembly take longer, but the uniform distribution of the stresses is rendered more difficult.

The arbors 19 and 20 are snugly fitted into the hollow open ends of the tension bolt 14 and may be of as great length as required, even extending to substantially the center of the warp beam, if desired. Of course, the tension bolt 14 may be of solid construction, and the arbors may be formed integral either with the bolt or with the end drums, but I prefer the construction described. It may be noted that in the use of well seasoned carefully selected light weight wooden warp beams of the relatively great length required, it may be a difficult and expensive operation to bore axially therethrough, for the entire length thereof, for which reason, such constructions do not easily admit of the convenient and effective combination of the tension bolt and the arbors, in the desirable axial construction shown.

In the construction described, the interior of the roll is substantially hollow, only the central or axial portion thereof being occupied by the hollow tension bolt. Ample room is, therefore, provided for the anchoring of the warp threads. In the specific preferred embodiment shown, I provide a wooden cleat 21 extending longitudinally within the roll and having a curved surface 22 snugly engaging the corresponding inner surface of the roll 10, and secured in position thereagainst as by screws 23 applied from the exterior of the roll. Secured to the cleat are a succession of anchoring hooks 24 for the warp threads, said hooks being simple sheet metal or wire members secured to the cleat as by nails, or screws 25, the effective hooking portions thereof extending as at 26 wholly within the contour of the roll. Openings 27 are provided through the roll by which free access is afforded to the anchoring hooks 26 for mounting and demounting the warp threads. The warp threads are knotted together at their inner ends in as many groups as there are anchoring hooks 26, exposed between the loom heads H, each knotted sheaf being anchored at the corresponding hook with the knot within the roll. The warp threads are then adjusted for uniform distribution upon the roll, whereupon the beaming is effected in the usual manner.

To adapt the warp beam for weaving fabrics of different widths, I provide a pair of oppositely facing loom heads H, adjustable along the length of the beam. Each of the loom heads may comprise a stamped or cast metal plate 28 having a peripheral flange 29 and radial ribs 30, which add to the stiffness thereof and has also formed as an integral part thereof, a split clamping hub 31 of considerable length, projecting from one side thereof. As shown, the stiffening ribs 30 are only of small thickness merging integrally with the base of the hub, and one of the ribs 30′ similarly merges with one of the lugs 32 of the split hub, the other lug 33 of which is relatively free. The inner diameter of the plate 28 is machined accurately perpendicular to the exterior diameter of the roll 10 so as to snugly engage the same and the hub 31 preferably provides only minute clearance which is taken up completely when the clamping screw 34 through the two lugs 32 and 33 is tightened. Thus, the loom head will be accurately at right angles to the surface of the roll regardless of the position in which it it clamped thereon, and without the need for

special truing operation. The simple construction of the metal loom head, is particularly effective in combination with the metal roll to which it is clamped directly without the danger of forming grooves, constrictions or other injury, which would be incurred if a similar element were clamped about a wooden warp beam.

If desired, the ends of the roll 10 may be threaded and the loom heads correspondingly modified to provide a connection similar to that shown in my prior patent above referred to. My present construction is, however, preferred. It is also understood that my present loom head may be substituted for that shown in my prior patent.

In the present embodiment, as shown, the rim 36 of each drum D extends inward from its end or head 13 to provide a concavity therebetween and the end of the roll, into which concavity the hub 31 of the adjacent loom head may telescope at least partly, so that a fabric of the maximum width may be produced with a warp beam of overall length shorter and lighter than in constructions which do not admit of the telescoping action or its equivalent.

From the foregoing it will be seen that my warp-beam is, in all parts, made of light metal, except the cleat 21 which is a piece of light wood. The roll of the beam is unusually short, but amply long for a fabric of maximum width. The tension bolt is hollow and light. The heads are comparatively light and strong. The drums are light and their construction and cooperative relation to the roll and bolt make for simplicity and effectiveness. Consequently, the beam as a whole is strong, durable, light, not liable to injury or wear, and is economically constructed and assembled and dismantled. There is practically no joint, slit, crack or seam throughout the length of the roll because of the true cooperative surfaces of the roll and heads which are so close and tight that no thread or fiber can become caught or snagged. For some purposes the roll 10 can be used without the heads. When so used, paper sheets are inserted between certain spiral layers of warp threads to prevent the warp threads at the edges from slipping as they are wound upon the roll.

I claim:

1. In a warp beam, in combination, a long thin-walled metal tube of diameter uniform from end to end, drums at the ends of the said tube, means securing said drums at the respective ends of said tube, said tube having a succession of openings therein between said drums, a cleat secured within the tube adjacent the openings, and thread anchoring hooks secured to the cleat one at each opening and accessible respectively through said openings.

2. In a warp beam, in combination, a hollow metal tube of diameter uniform from end to end, a cleat extending longitudinally against the inner wall of said tube, means securing said cleat in position, anchoring hooks for the warp threads secured to said cleat and wholly within the contour of the outer surface of the tube and openings in the wall of said tube for access to the anchoring hooks.

3. In a warp beam, in combination, a roll comprising a cylindrical boiler tube of strictly uniform diameter from end to end, limiting heads snugly cooperating with said roll, tension drums fitted over the ends of said roll, bolt means extending through said roll and clamping said drums against the end thereof, and independent arbors coaxial with said roll protruding beyond said drums.

4. In a warp beam, in combination, a hollow boiler tube of strictly uniform diameter from end to end, limiting heads snugly cooperating with said roll, drums contacting the extreme ends of the tube and securing means extending longitudinally through the tube and threaded to said drums, whereby tension will be exerted on said securing means and concurrently therewith a compressive strain upon said tube.

5. In a warp beam, in combination, a hollow cylindrical boiler tube of uniform diameter throughout and having its ends beveled, drums having hubs telescoped into the ends of said tube and flanges grooved to accommodate the beveled ends of said tube, a tension bolt member extending axially through the length of said tube and threaded into corresponding axial bores in the drum hubs to place the bolt member under tension and concurrently therewith exert compressive strain through said drums upon said tube.

6. The combination set forth in claim 5, in which the bolt comprises a hollow small-gauge boiler tube and in which removable supporting arbors are fitted in the open ends of said tube.

7. In a warp beam in combination, a cylindrical hollow roll of diameter strictly uniform from end to end, drums at the ends of said roll and secured thereto, each drum having an end flange and a rim, the rims of the drums extending toward each other and oppositely facing limiting heads slidably mounted on said roll, said heads having hubs adapted in extreme outer position to telescope into the spaces between the ends of the roll and the drum rims.

8. A warp-beam formed of a boiler tube of uniform diameter throughout, heads mounted on the beam between its ends, tension drums mounted on the beam at its opposite ends, a tension bolt extending through the beam and having means on the ends

thereof engaging the drums, and means also on the ends of the bolt for engaging the drums and locking the same in position on the bolt and beam, and all the parts being formed of metal.

9. A warp-beam formed of a boiler tube of uniform diameter throughout, heads mounted on the beam between its ends, tension drums mounted on the beam at its opposite ends, said drums each having a hollow hub fitting within the beam, a hollow tension bolt extending through the beam and having means on its ends engaging the hubs of the drum, and means also on the ends of the bolt for locking the drums in position on the bolt and beam, and all the parts being formed of metal.

10. A warp-beam having all its parts made of metal, and the roll being hollow and smooth from end to end, limiting heads snugly fitted upon the roll between its ends and means for securing the heads to the roll, tension drums applied to the ends of the roll and each having an axial hub fitted within the adjacent end of the roll, and tension means threaded into said hubs and also engaging the latter to hold the drums to the roll.

11. A hollow warp-beam of uniform diameter from end to end and having its entire circumference smooth, limiting heads snugly fitted upon the roll between its ends and means for securing the heads to the roll, tension drums applied to the ends of the roll and each having a hub with interior threads, a hollow tension bolt extending through the roll and having its ends threaded into the hubs, and nuts on the bolt to lock the drums clamped to the roll.

12. A warp-beam comprising a hollow roll, drums having hubs projecting into and centered in said roll, tension means cooperating with the hubs and holding the roll and drums together comprising a bolt passing through the hubs, and lock nuts engaging the hubs.

13. A warp-beam comprising a hollow roll of uniform diameter from end to end, and having its circumference smooth from end to end, drums having rims overhanging the roll and axial hubs entering the roll, means for clamping the drums to the roll, and loom heads snugly fitted to the roll provided with clamping collars adapted to slide within the rims.

14. A warp-beam comprising a hollow roll of uniform diameter from end to end and having its circumference smooth from end to end, drums having central hubs fitting smoothly in the roll, a tubular tension bolt threaded through the axis of the hubs, nuts threaded on the bolt and engaging the hubs to hold the drums endwise against the roll.

Signed at New York in the county of New York and State of New York this 27th day of March, A. D. 1923.

ARTHUR BALTHASAR.