

June 4, 1940.

R. U. THORNTON

2,203,584

WARPER BEAM

Filed June 17, 1939

3 Sheets-Sheet 1

Fig. 1.

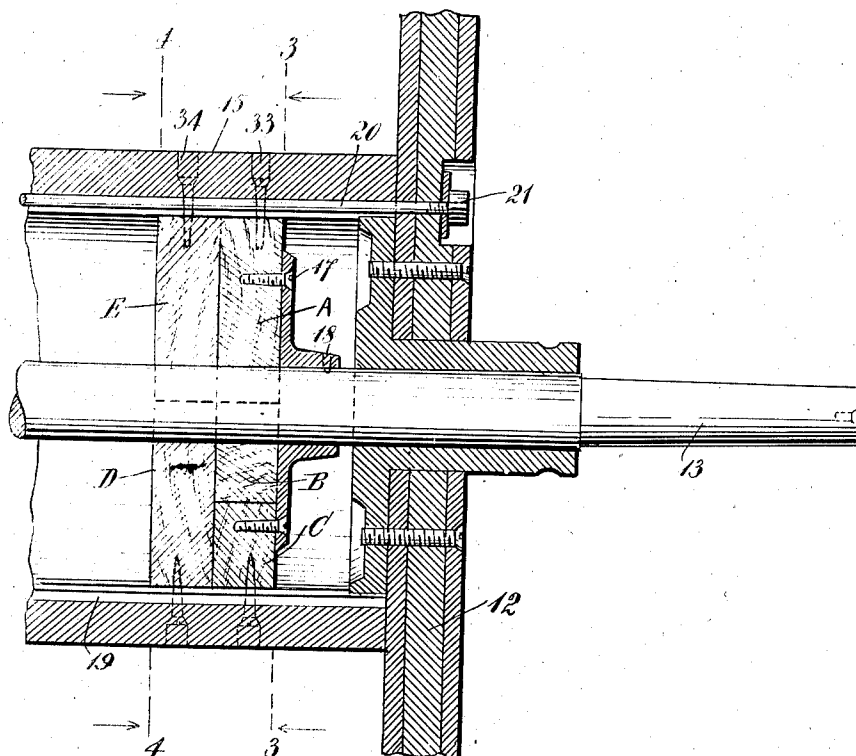
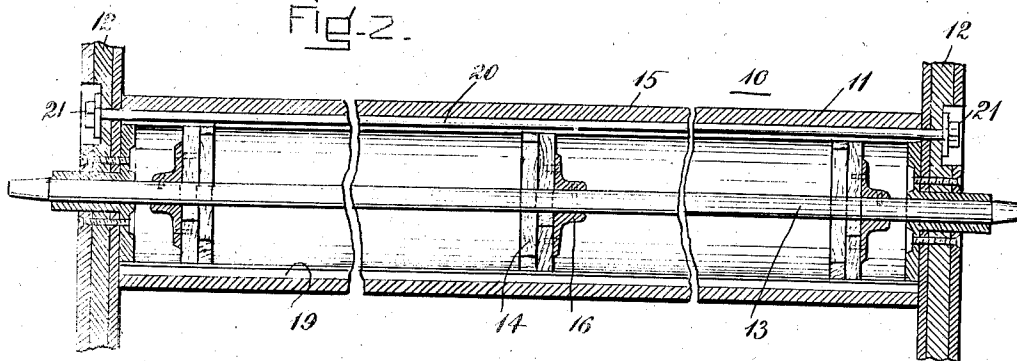


Fig. 2.



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3 Sheets-Sheet 3

FIG. 6.

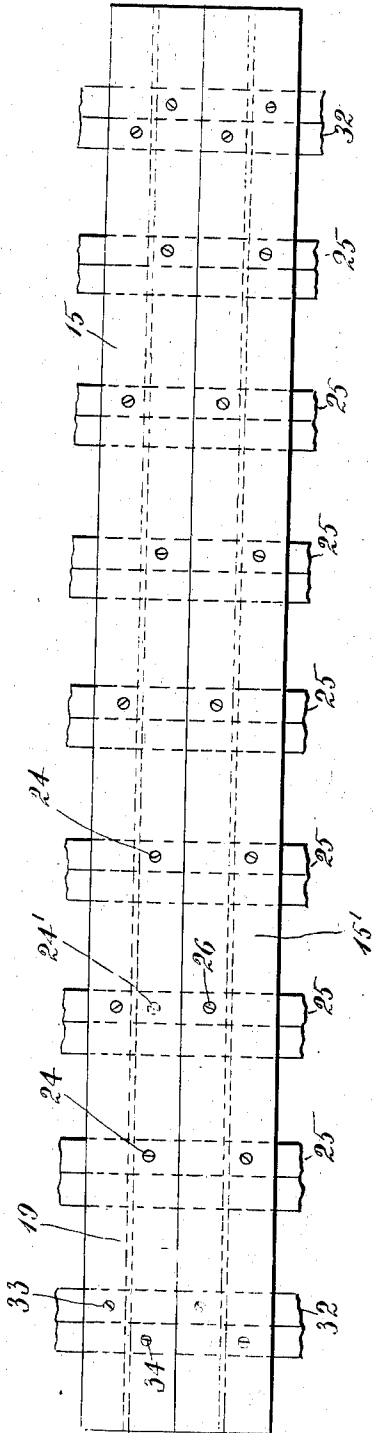
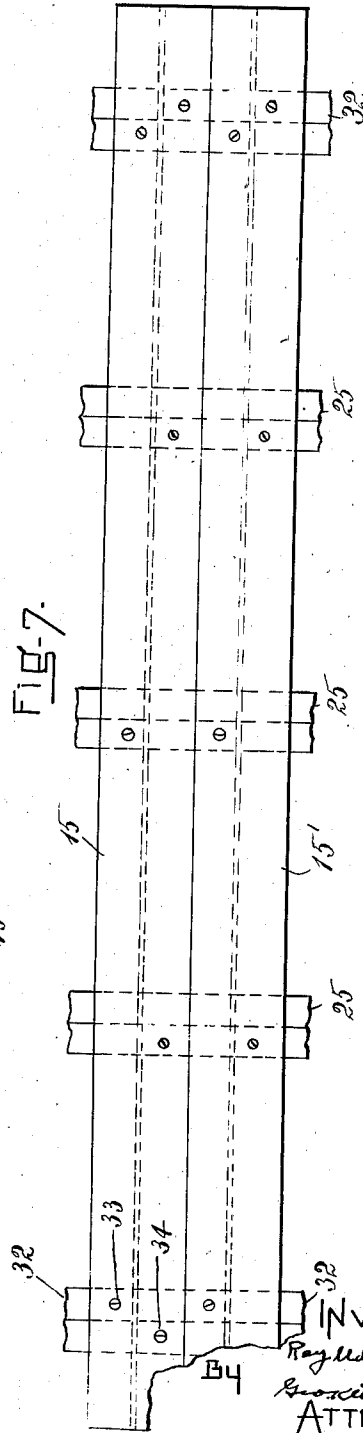


FIG. 7.



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UNITED STATES PATENT OFFICE

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WARPER BEAM

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5 Claims. (Cl. 242—124)

In the use of warper beams of the type shown in my Patent No. 2,148,394, February 21, 1939, wherein the side face of each of the barrel staves is provided with a longitudinally extending groove for receiving rods whereby the beam heads and barrel are held together and the screws which attach the staves to the discs or inner heads are all in alignment with the central longitudinal axis of the stave, there is a tendency for the outer edges of the staves to rise slightly after the yarn, especially rayon or other heavy yarn, carried by the beam has been unwound.

It has been found also that in beams which carry heavy yarn, such as rayon, there is a tendency for some of the end portions of the staves, each of which is secured by a single screw to the two end discs, to become loosened on account of the different screw-holding power of the various peripheral portions of the discs, such holding power varying with the relative positions of the screws and the grain of the wood of which the discs are formed.

Because of the behavior above recited of the beams it frequently was necessary, after a period of use, to re-turn the barrel in order to restore it to its original smooth cylindrical contour.

The object of the present invention is to provide a warper or section beam whereby the foregoing limitations are eliminated.

With this object in view, my invention comprises a beam each stave of which has a longitudinally extending groove on its under side substantially midway between its side faces, some of said grooves, for example, every alternate groove, receiving metallic rods the ends of which pass into or through the beam heads and cooperate with means whereby they are suitably tensioned to secure the heads and the barrel together; and screws or other holdfast means staggered with respect to said grooves and engaging the discs.

My invention comprises also means whereby the difference in screw-holding power of the several peripheral portions of the discs is equalized, a preferred means being the provision of discs of cross banded wood having at least two layers, the grain of the bands of one layer having directions different from the grain of the contiguous bands of the other; together with at least two screws or other holdfast means passing through each stave near the respective ends thereof and into two contiguous bands of said discs, respectively, the said screws having differing relative positions with the grain of the wood of said bands, for example, one being across the grain of one

of said bands, and the other in line with the grain of the contiguous band or else making an angle therewith that is less than 90°.

In the drawings which accompany and form a part of this specification, Figure 1 is a fragmentary longitudinal section of the end portion of a beam embodying my invention, the plane of the section being indicated by the line 1—1 of Figs. 3 or 4.

Fig. 2 is a longitudinal section on a smaller scale of said beam.

Fig. 3 is a transverse section taken substantially on the line 3—3 of Fig. 1.

Fig. 4 is a section taken substantially on the line 4—4 of Fig. 1.

Fig. 5 is an edge view of one of the discs or inner heads as seen from the left-hand side of Fig. 3 after the staves have been removed.

Fig. 6 is a fragmentary plan view of a beam such as used for rayon or other very heavy yarn.

Fig. 7 is a fragmentary plan view of a beam of the type used for yarns of the lighter grade.

In the illustrative embodiment of my invention shown in the drawings, 10 is a section or warper beam comprising a barrel 11, heads 12, said heads being mounted on the shaft 13, and discs or inside heads 14, the number of which depends upon the length of the beam and the character of the yarn carried thereby. The barrel is formed by securing a series of staves 15 (designated *a* to *j*, inclusive, in Figs. 3 and 4) to the discs by suitable holdfast means, such as screws, and the discs are held on the shaft by any suitable means, such as the flanged collars 16 attached to the discs by screws 17 and to the shaft by the set screws 18. Passing through grooves 19 formed in the under side of each stave substantially midway between the side faces thereof, are metallic rods 20, the ends of which project part way through the heads 12 and are threaded to receive the nuts 21 whereby said heads are drawn against the ends of the barrel.

As shown in Figs. 3 and 4, one side face of each stave is provided with a longitudinally extending groove 22 for receiving the tongue 23 of the adjacent stave. In the present instance, the rods 20 are shown as disposed in the grooves 19 of alternate staves.

In the case of beams of the longer type and on which rayon and other heavy yarns are wound, it is customary to employ as many as nine discs or inner heads, and in Fig. 6, which is diagrammatic in character, there are shown two staves 15, 15', attached to the peripheries of nine discs. It will be noted that the screws 24 which pass

through each stave and into the inner heads 25, herein shown as seven in number, are staggered with respect to the groove 19 of such stave. By this arrangement a substantial improvement is effected in that the contour of the barrel is maintained and the re-turning of the same after its use with rayon is rendered unnecessary. It would seem that the disposition of the longitudinal grooves 19 in the substantial centre of the under side of the staves increases somewhat the resiliency of the staves whereby a closer contact thereof with the discs is rendered possible than in the case of the beam of my prior patent aforesaid, especially where the screws 24 of the intermediate discs are staggered with respect to the groove. By virtue of the tongue and groove connection between contiguous staves, it has been found unnecessary to use two screws for attaching a stave to any one disc, for example, the screw 26, whereby the stave 15' is attached to one of the inner heads, operates through the tongue and groove connection of the two staves in such manner that the portion of the stave 15 that abuts the stave 15' is held to the disc as securely as it would be if a second screw were passed through the stave 15 and into the disc at the point indicated in dotted lines at 24'.

The cause of contour distortion at the ends of a beam, whether relatively long and used for heavy yarn, (Fig. 6) relatively long and used for lighter yarn, as shown in Fig. 7, or relatively short, is removed by equalizing the screw-holding power of the several peripheral portions of the discs in the following manner.

Each disc is formed of a plurality of layers of cross banded wood, glued together, two such layers being shown in the present instance, the grain of the bands on one layer having directions different from that of the contiguous bands of the other. Referring to Figs. 3 and 5, the bands of the right-hand layer are indicated at A, B, and C; the band A being shown as semi-circular; the band C as a segment of a circle; and the intermediate band B having parallel sides and arcuate ends. Preferably the meeting edges of adjacent bands are provided with tongue and groove connections 27. Referring to Fig. 4, which shows the face of the disc opposite to that appearing in Fig. 3, it will be noted that the bands E, D, and F, are respectively at right angles to the bands A, B, and C of the right-hand layer of the disc. The dividing lines 28, 29, of the bands of the right-hand layer (Fig. 3) appear as dotted lines in Fig. 4, and the dividing lines 30, 31, of the bands of the left-hand layer (Fig. 4) are shown as dotted lines in Fig. 3.

The two end discs 32, 32, (Fig. 6) are constructed in the manner above described and if desired the spaced inner discs 25 also may be and preferably are so formed. As indicated in Figs. 3 and 4, the grain of the bands A, B, and C, have directions different from the grain of the contiguous bands E, D, and F. As the screw or nail holding power of wood varies with the relative position of such holdfast means and the grain of the wood, I position the screws which hold the staves to the end discs 32, 32, in such manner that they pass into two contiguous bands of different layers of the discs and are disposed on opposite sides of the groove 19. Thus, referring to Fig. 6, it will be seen that screw 33 passes into the right-hand side or layer of disc 32 on one side of the groove 19; and that the screw 34 passes into the left-hand side or layer of said

disc, on the other side of said groove, and by referring to Figs. 3, 4, and 5, it will be seen that each pair of screws 33, 34, take into the disc at points where the angular relation of the grain of the wood with the respective screws is different. As shown in Figs. 6 and 7, the preferred spatial arrangement of each of the pairs of screws 33, 34, or other holdfast means, is that a line joining the members of each said pair makes an acute angle with the longitudinal axis of the stave through which they pass. While this is the preferred arrangement, my invention is not limited thereto because an improvement is effected where the members of each pair of screws are on opposite sides of the groove 19, irrespective of said spatial relation.

Illustrating further the angular relation of the screws with respect to the grain, it will be noted by reference to Figs. 3 and 5, that screw 33 passes through stave *j* into band A through hole 33' in a direction very nearly parallel with the grain of the wood, or at least at a very small angle therewith so that the power of the wood to hold the same is comparatively small; and by reference to Figs. 3 and 5, it will be seen that screw 34 of said stave *j* passes into the band F of the left-hand layer or side of the disc through the hole 34' in a direction practically at right angles to the grain of the wood so that the power of the wood to hold the screw is comparatively large.

In addition to the tendency of heavy loads of yarn to press down the longitudinal central portions of the staves resulting in a light uprising of the edge portions after the yarn has been removed, a difficulty that I have overcome by the provision of the centrally disposed grooves 19 and the staggering of the screws with respect thereto, it has been found that if the end portions of the staves become slightly moistened, as by exposure to rain, or even to an excessively humid atmosphere, there will be a contour distortion at or near the ends of the barrels, such distortion probably being due to the fact that the tightening of the screws 21 and the resulting tensioning of the rods 20 subject the staves to a very considerable longitudinal compression. It is for this reason particularly important to so arrange matters, as above described, that the screw holding power of the end discs 32 shall be practically equalized. It is to be understood, however, that this arrangement need not necessarily be employed in connection with the staggering of the screws that hold the staves to the intermediate discs, as illustrated in Fig. 6, and it is to be understood also that a beam formed of staves having longitudinal grooves on their under surfaces secured to the discs by screws or other fastening means which are staggered with respect to the grooves is useful without the above described means for equalizing the screw holding power of the end discs. Preferably, however, both of these arrangements are used together to secure the best results both as to smoother running and the prevention of contour distortion. In this connection, it will be understood that a section or warper beam in operation has a very high peripheral speed of rotation and that therefore it must be perfectly balanced. Obviously any non-uniform rising or lifting of portions of the staves will destroy the balance of the beam. Having thus described an illustrative embodiment of my invention without, however, limiting the same thereto, what I claim and desire to secure by Letters Patent is:

1. A warper beam comprising a barrel com-

posed of two discs located near the respective ends of the barrel and staves spaced around said discs, each said disc having two layers of wood, each said layer having a plurality of bands and the grain of the bands of one layer having directions different from the grain of the contiguous bands of the other, and holdfast means passing through each stave near the respective ends thereof and into two contiguous bands of different layers of said discs, respectively, at points where the angular relation of the grain of the wood with the respective holdfast means is different.

2. A warper beam comprising a barrel composed of two discs located near the respective ends of the barrel and staves spaced around said discs, each said disc having two layers of wood, each said layer having a plurality of bands and the grain of the bands of one layer being substantially at right angles to the grain of the contiguous bands of the other, and holdfast means passing through each stave near the respective ends thereof and into two contiguous bands of different layers of said discs, respectively, at points where the angular relation of the grain of the wood with the respective holdfast means is different.

3. A warper beam comprising a barrel composed of two discs located near the respective ends of the barrel and staves spaced around said discs, each said stave being provided on the under side thereof and substantially midway between its side faces with a longitudinally extending groove, each said disc consisting of two layers of cross-banded wood, holdfast means passing through each stave near the respective ends thereof and into two contiguous bands of different layers of said discs, respectively, heads disposed on the respective ends of said barrel,

metallic rods disposed in a plurality of said grooves and passing into said heads, and means co-operating with the ends of said rods for holding the heads and barrel together.

4. A warper beam comprising a barrel composed of two discs located near the respective ends of the barrel and staves spaced around said discs, each said disc having two layers of wood, each said layer having a plurality of bands and the grain of the bands of one layer having directions different from the grain of the contiguous bands of the other, and a pair of holdfast means passing through each stave near the respective ends thereof and into two contiguous bands of different layers of said discs, respectively, at points where the angular relation of the grain of the wood with the respective holdfast means is different, the line joining the members of each said pair of holdfast means making an acute angle with the longitudinal axis of the stave through which they pass.

5. A warper beam comprising a barrel composed of two discs located near the respective ends of the barrel and staves spaced around said discs, each said disc having two layers of wood, each said layer having a plurality of bands and the grain of the bands of one layer being substantially at right angles to the grain of the contiguous bands of the other, and a pair of holdfast means passing through each stave near the respective ends thereof and into two contiguous bands of different layers of said discs, respectively, at points where the angular relation of the grain of the wood with the respective holdfast means is different, the line joining the members of each said pair of holdfast means making an acute angle with the longitudinal axis of the stave through which they pass.

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