

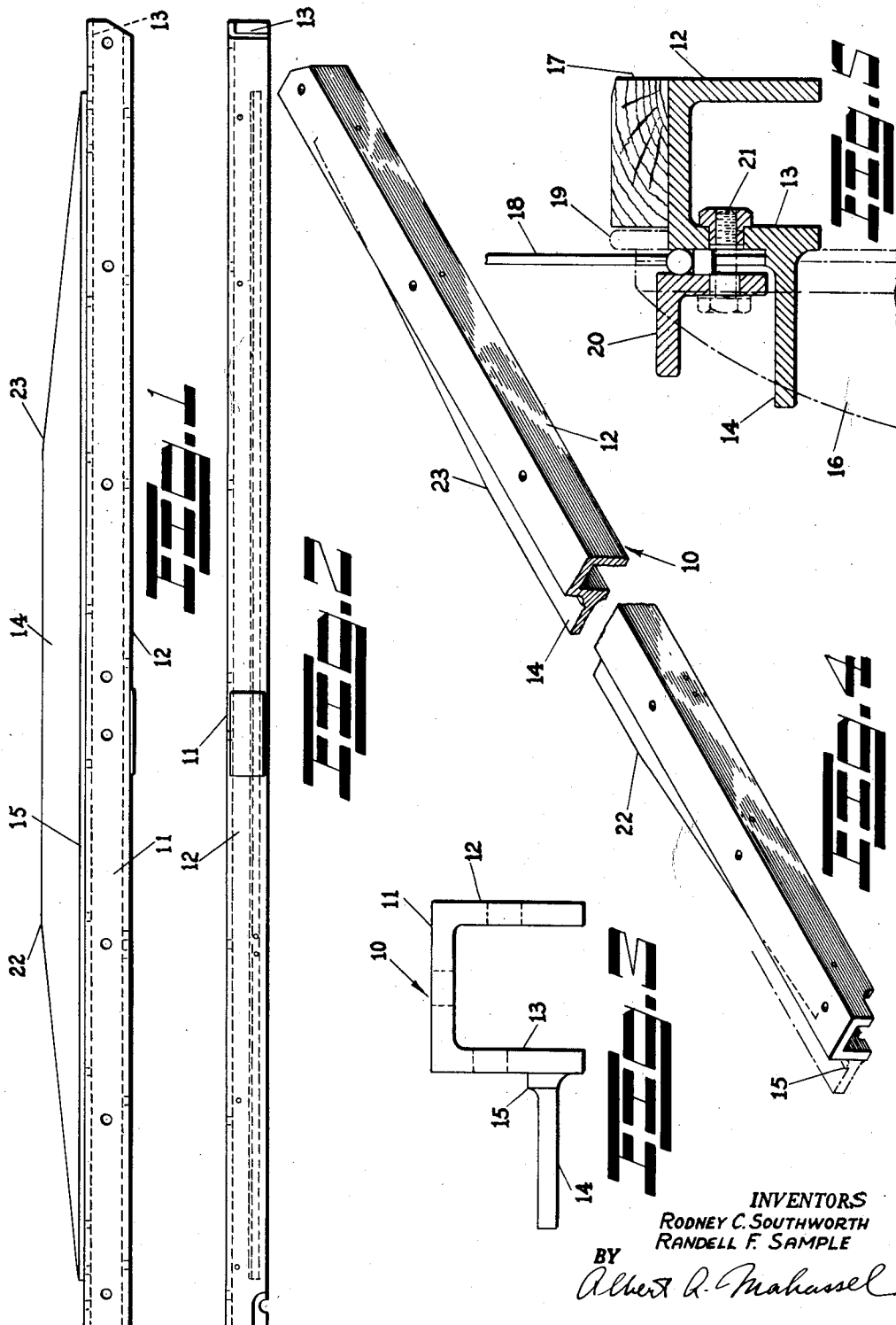
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LOOM LAY BEAM

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## LOOM LAY BEAM

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This invention pertains to looms for weaving and, particularly, to a novel lay beam for looms of the shuttleless type such as disclosed in United States Patent No. 2,654,399.

It is a general object of the invention to provide a metallic lay beam of light weight construction, having greater stiffness and with an extended life expectancy over lay beams of the prior art.

It is a further object of the invention to provide a lay beam which will deflect less at time of beat-up than the aforementioned lay beams and one in which the majority of known points of stress concentrations have been removed, thus reducing the strain acting upon it during loom operation.

It is a further and more specific object of the invention to provide a lay beam having a cross-sectional configuration which, when subjected to the loads imposed thereon, resists twisting or rotation about its linear axis due to the particular shape of the cross section of the lay, which causes the loads imposed thereon to be applied through a point in said section a distance from the centroid thereof.

Further objects and advantages will become apparent from the following more detailed disclosure.

Shuttleless looms of the type to which the instant invention is applicable are provided intermediate the loomsides with swords for supporting the loom lay beam and for guiding the same in a known manner through the arc of travel it is caused to follow during loom operation.

The increased speeds of present-day looms in combination with the increased resulting forces to which its numerous components are subjected, has in many instances decreased the life expectancy of certain parts and has introduced the need for stronger and improved parts and mechanisms to correct conditions of this nature.

By way of example, if weight factors were favorable, the metallic lay beams utilized in shuttleless looms prior to the instant invention did not possess sufficient stiffness to resist excessive and repeated deflecting of said lay at each beat-up of the loom. This inability to resist excessive deflection in combination with the stress concentrations within the lay, weight of the lay and the stepped up operating speeds of the looms themselves led to fatigue failure of said lay beam. Failure of this nature is considered premature with regards to the desired life expectancy of the lay beam and necessitates an undesired amount of loom down-time while the necessary repairs or replacements are being made.

According to the instant invention, a novel, light weight metallic loom lay beam can now be provided which because of its cross-sectional configuration and being of light weight construction is more resistant to the excessive deflections that were experienced with the lay beams of the prior art.

Laboratory conducted analytical, structural fatigue, and performance comparison tests on lays of the prior art along with those of the instant invention, and which will be more fully described hereinafter, showed applicants' lay to be the preferred structure for the weaving conditions to which the shuttleless looms are now subjected.

The invention will be described in detail by reference to specific embodiments thereof one of which is illustrated in the accompanying figures of drawing, wherein:

FIG. 1 is a plan view of a lay beam according to the

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invention showing the preferred manner of tapering the web portion;

FIG. 2 is a side elevation of the lay beam shown in FIG. 1;

FIG. 3 is an end view of the lay beam shown in FIGS. 1 and 2;

FIG. 4 is an isometric view of a finished lay beam according to the invention, unassociated with other loom parts and having a section removed for convenience of illustration; and

FIG. 5 is a sectional view of the lay beam according to the invention showing the relative positions of the raceway, reed and reed clamping member when assembled thereto.

Now referring to the figures of drawing, there is shown in FIG. 3 by means of an end view, the general shape of the extruded, light weight metallic lay beam indicated generally by numeral 10. Being of unitary construction, lay beam 10 is formed in part as an inverted U-section having a top planar surface 11. Extending downwardly from surface 11 and integral therewith, there is provided a vertical front wall 12 which forms the front of the lay beam. A rear wall 13 interconnected with surface 11 extends downwardly therefrom and being in opposed relationship to front wall 12 it extends parallel therewith for the entire length of the lay. Extending rearwardly in a horizontal plane, with respect to the top planar surface 11, rear wall 13 includes a web member 14 disposed intermediate the upper and lower extremities of said wall 13. Web member 14 includes an angularly formed seat in the form of a step 15 on which the lower portion of the reed is caused to seat when assembled to the lay.

FIG. 5 shows a portion of one of the loom swords 16 which supports the lay beam at one end along with other associated components which assemble to the lay beam including a wood raceway 17, a reed 18, a bottom shed support 19 and a reed clamping member 20. The lower end of reed 18 seats in step 15 and the lower portion of the reed is firmly held between the rear wall 13 of the lay and the clamping member 20 by means of a plurality of bolts 21 passing through aligned apertures positioned at spaced intervals along the length of these members. The bottom shed support 19 is positioned on the rearward edge of the top planar surface 11 between raceway 17 and reed 18 and being constructed of a wear resistant material, is adapted to contact the lower warp sheet during loom operation to prevent said warp from wearing into said raceway.

The cross-sectional configuration of the lay beam 10 is such as to provide a relatively light weight construction and yet possess sufficient stiffness to resist excessive deflections during loom operation plus the forces to which it would be subjected on sudden loom stoppages.

To lessen the weight of the lay and still maintain the rigidity through the areas subject to deflection, the lay beam can, as shown in FIGS. 1 and 3, be machined by tapering the web member 14 from central points thereof such as at 22 and 23 outwardly to the ends of the lay.

The aforementioned laboratory conducted analytical, structural fatigue, and performance comparison tests on lay beams of the prior art along with those of the present invention will now be referred to by disclosing data obtained from lay beams of nearly the same weight.

Structural fatigue tests were conducted on a standard test machine, having a capacity of two thousand pounds, to obtain the endurance capacity and stiffness of the lay beam structure. The nominal stresses imposed thereon were measured with standard strain gauges.

Unlike the sectional configuration of the lay of the present invention, the lay beam on which these comparison tests were made and which was used on shuttleless looms prior to applicants' lay is substantially different structural-

ly. This lay has a cross-sectional configuration which is generally H-shaped and includes a clamping member on its rear wall for holding and positioning the reed, whereas applicants' lay includes in addition to the reed clamping member a horizontally disposed and rearwardly directed integral web member for added rigidity during loom operation.

For the sake of simplicity, applicants' lay beam will be referred to hereinafter as lay "A" and the lay beam of the prior art which underwent these comparison tests will be referred to as lay "B."

In the fatigue test, the test machine was set up with a preload of 800 lbs. and a dynamic load of  $\pm 650$  lbs. The forces imposed upon these lay beams were greater than would be had under actual loom running conditions and these forces were concentrated at those points of compression at beat-up and where tension is set up at overthrow of the lay. By overthrow is meant the instant the lay reverses its direction of travel after beat-up or that period of time it is returning to the initial state it had prior to beat-up.

In this fatigue test, lay "B" broke after 1,755,000 cycles of compression at beat-up and withstood only 204,000 cycles of the tension to which it was subjected at overthrow before failing.

Lay "A" was subjected to 50,000,000 cycles of compression at beat-up and 122,000,000 cycles of overthrow tension and no indication of failure was evident at the completion of this test.

Lays "A" and "B" under loads applied at those critical points that would be affected in actual loom operation, were measured on the test machine for the amount of movement each lay deflected under identical conditions. Lay "B" deflected .100" in the beat-up direction and .130" in the overthrow direction. Lay "A" deflected .060" in the beat-up direction and .050" in the overthrow direction.

A static test which consisted of a two hundred forty-pound concentrated load at the center of each lay beam showed a deflection on lay "B" of .061" in the beat-up direction and .055" in the overthrow direction. Lay "A" showed considerably less deflection when subjected to this load with only .036" in the beat-up direction and .037" in the overthrow direction.

Nominal stresses were measured in p.s.i. and lay "B" had a range of 9500/9670 during compression at beat-up and a range of 11,000/14,000 when subjected to the tension at overthrow. The stresses at these points with lay "A" were considerably less in that with the compression at beat-up the measured stresses showed a range of 4430/5270 and a range of 5640/6900 when subjected to the tension at overthrow.

It is evident from the foregoing and the tests made under actual loom operating conditions that applicants' novel lay beam is a decided improvement over lay beams of the prior art. In operation the lay beam of the present invention is far more resistant to twisting and deflection which lead to fatigue failure than the aforementioned lays, and possessing added rigidity, it automatically lengthens the life expectancy of the lay.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive concept

may be carried out in a number of ways. This invention is, therefore, not to be limited to the precise details described, but is intended to embrace all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

We claim:

1. In a loom for weaving having swords and a reed, a light weight metallic lay beam of unitary construction formed in part as an inverted U-section including top, front and rear walls and a web extending rearwardly from said rear wall and providing in conjunction with the rear wall an angularly formed seat for the reed.

2. In a loom for weaving having swords and a reed, a light weight metallic lay beam of unitary construction formed in part as an inverted U-section including top, front and rear walls and a web extending rearwardly from said rear wall and providing in conjunction with the rear wall an angularly formed seat for the reed, said web being positioned intermediate the vertical extremities of the rear wall.

3. In a loom for weaving having swords and a reed, a light weight metallic lay beam of unitary construction formed in part as an inverted U-section including top, front and rear walls and a web extending rearwardly from said rear wall and providing in conjunction with the rear wall an angularly formed seat for the reed, said web being positioned intermediate the vertical extremities of the rear wall, and is tapered from a central section of the beam toward the ends.

4. In a loom for weaving having swords and a reed, a light weight metallic lay beam of unitary construction formed in part as an inverted U-section including top, front and rear walls and a web extending rearwardly from said rear wall and providing in conjunction with the rear wall an angularly formed seat for the reed, a clamping member bolted to said rear wall to support said reed in position.

5. In a loom for weaving having swords and a reed, a light weight metallic lay beam of unitary construction including a top planar surface extending the length of said lay beam, a vertical front wall extending downwardly from said planar surface and an opposed, parallel rear wall integrally formed with said top planar surface, said rear wall including a longitudinally extending and rearwardly directed web portion, said web being integral with and disposed intermediate the upper and lower ends of said rear wall, said lay beam including a means for attachment to said swords and a further means for fixedly positioning said reed thereto.

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