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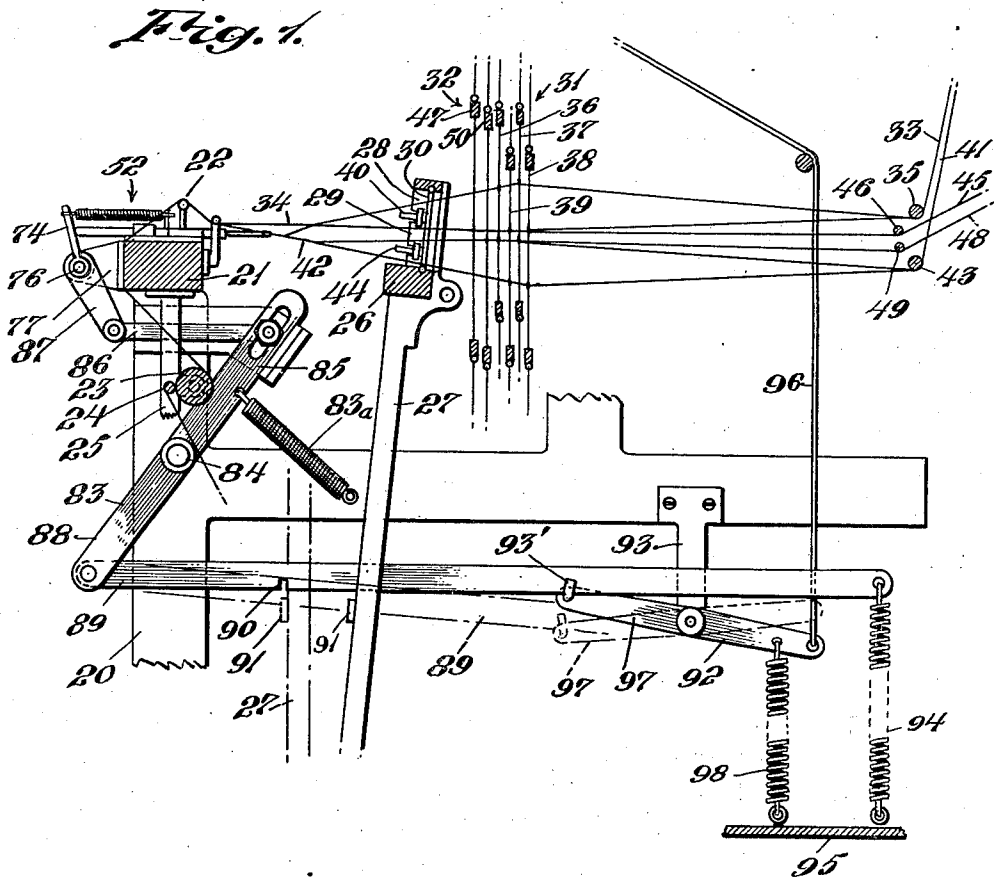
T. BRINDLE

2,346,551

LOOM FOR WEAVING LADDER WEBBING

Filed Sept. 21, 1942

3 Sheets-Sheet 1



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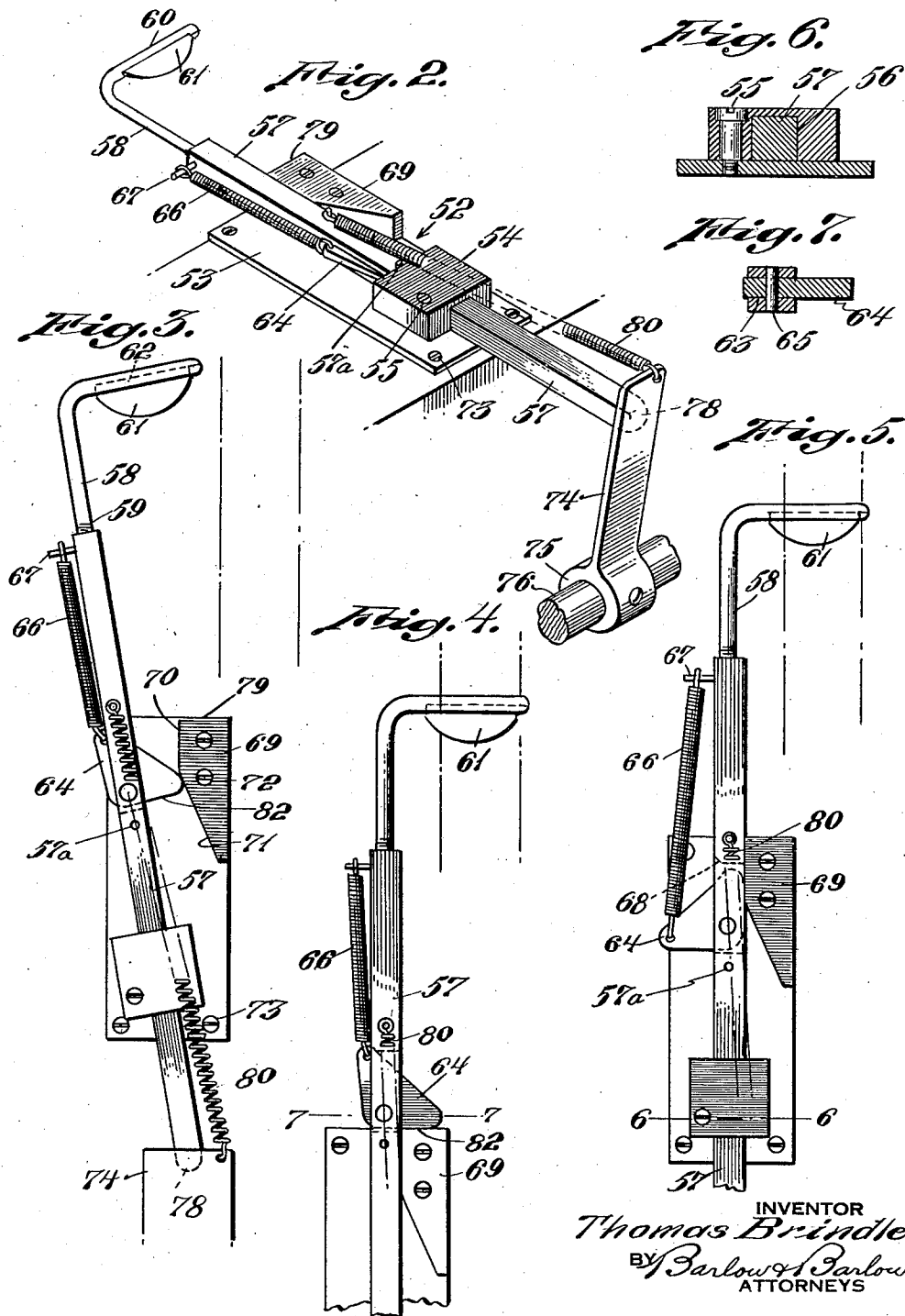
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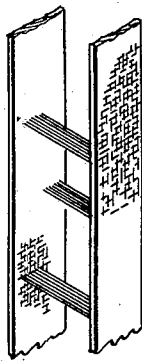
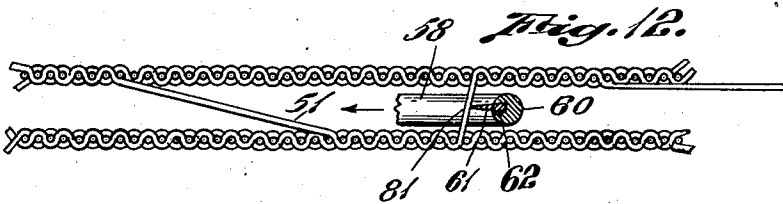
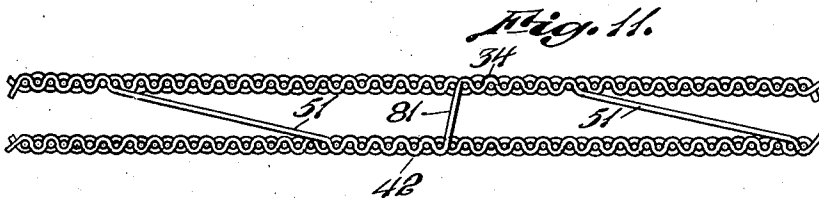
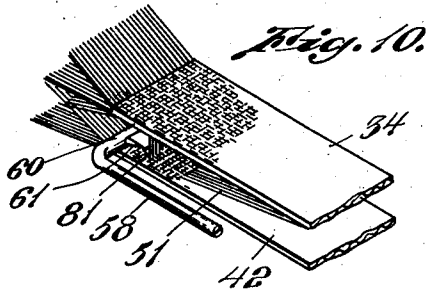
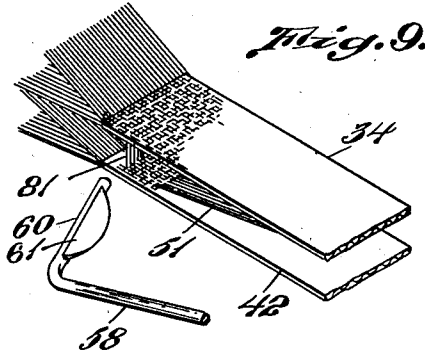
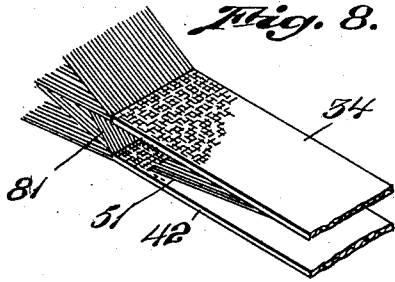
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UNITED STATES PATENT OFFICE

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LOOM FOR WEAVING LADDER WEBBING

Thomas Brindle, Pawtuxet, R. I.

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10 Claims. (Cl. 139—22)

This invention relates to improvements in looms for weaving ladder webbing in which the cross straps are composed of warp and weft, or warp only and in either case woven into the respective bands at their ends.

In making this type of webbing, it is usual to weave the outer lengths of banding and cross straps as a simultaneous operation. The warp which forms the cross straps is woven alternately into one banding and then the other to bind the portion forming the cross strap in place. The cross over or joining portions of the warp between the woven-in portions of the cross straps is severed in order that a separation of the bands can be had. This severing is usually a manual operation, entails considerable labor and is a separate operation made usually after the removal of the webbing from the loom.

An object of this invention is to provide a loom in which the aforementioned severing will be mechanically made while the loom is in motion.

Another object of this invention is to provide in a loom for weaving ladder webbing a mechanism for severing the aforementioned cross over warp portion actuated by some moving part of the loom.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 illustrates a fragmental portion of a loom embodying features of my invention;

Fig. 2 is a perspective view showing an assembled mechanism operable for severing the warp portions joining the ends of the cross straps;

Figs. 3, 4, and 5 are plan views of the device shown in Fig. 2, showing different positions thereof in the cycle of its motion;

Fig. 6 is a sectional view taken substantially on line 6—6 of Fig. 5;

Fig. 7 is a sectional view taken substantially on line 7—7 of Fig. 4;

Figs. 8, 9, and 10 each show in perspective, diagrammatically, several stages of the relationship between the several parts of the webbing and parts of the severing mechanism;

Fig. 11 illustrates diagrammatically the woven relationship between the bandings and cross strap;

Fig. 12 is a view similar to that shown in Fig. 11 but additionally showing a part of the severing

tool in position to sever the warp portion joining the woven-in portions of the cross strap; and

Fig. 13 is a perspective view of a webbing having two rows of cross straps.

The fragmental portion of the loom illustrated in the drawings is of a usual construction for making ladder webbing and has a side frame 20 the forward end of which supports one end of the breast beam 21 on which is mounted a guide bar 22 over which the webbing is guided to the take-up rolls 23 and 24. These rolls are supported at one end by a bracket 25 depending from the bottom side of the breast beam 21.

This loom has a lay 26 supported on swords 27, only one being shown, and which are rockably mounted. The lay carries the reed 30 and usual spaced shuttle races 28 and 29. Only two shuttle races are shown but it will be understood that when the cross straps of the webbing are composed of warp and weft sufficient shuttle races and shuttles will be provided for making such type of webbing; the cross-straps of the webbing herein shown consist of warp only.

The harnesses 31 shown in the drawing for manipulating the warp forming with weft the outer bandings of the webbing are furnished with heddles of the type having spaced eyes while the harnesses 32 for manipulating the warp of the cross straps have heddles of the single eye type. All of these harnesses may be connected in the usual manner such as by flexible connectors to any of well-known types of shedding mechanism such as a dobby or jacquard motion, not shown. The arrangement and number of harnesses shown in the drawings are merely illustrative and not significant of any particular weave design.

In the operation of the loom just described the warp 33 which forms the upper banding 34 passes beneath the upper guide roll 35 and the individual threads of the warp are threaded through the upper eyes of the heddles 36, 37, 38, and 39, then through the reed 30 to be combined in a usual manner with weft dispensed from the shuttle 40. The warp 41 forming the lower web 42 is passed beneath the lower guide roll 43 and the individual threads of the warp are then threaded through the lower eyes of the heddles 36, 37, 38, and 39, then through the reed 30 to be combined with weft dispensed from the lower shuttle 44. A separate warp, one for each row of cross straps, is usually provided. There being two rows of cross straps shown, two warps are shown. The warp 45 passes beneath a guide and slackener rod 46 through the heddles

of the harness 47 and through the reed 30 to be incorporated in the webbing to be formed. The warp 43 of the other row of cross straps passes beneath the guide and slackener rod 49, through the heddles of the harness 50 and then through the reed 30 to be also incorporated in the webbing to be formed. During the weaving of the warp and weft of the bandings the harnesses 32 which control the warp of the cross straps are actuated in a manner and in proper timed relation to weave-in or tie in the warps of the cross straps in the bandings with the wefts thereof to anchor the cross straps in the bandings at the completion of each length of cross strap. In the instant case warp only form the cross straps and these warps are floated as shown at 51 in Figs. 11-12 for the distance required to provide sufficient length of cross strap and then crossed over into the other banding and combined with the wefts therein a distance sufficient to tie these portions of the warp in the banding and which completes a cross-strap.

It will be seen that the portions 51 of these warps which extend from one band to the other are not combined with any weft and are merely floated warps. Hereinafter these portions 51 will be referred to as the cross-straps of the webbing so as to distinguish from the portions of the cross warps which extend from banding to banding between the woven-in adjacent end portions of the cross-straps. These extending end portions will be referred to as cross-over or joining warp portions 81.

At each crossing from one banding to the other between the weave-in portions of the cross strap warps the slackener rod of the warp being crossed over is manipulated in a manner to provide a slack in the warp to provide for this length of cross over or joining warp portions 81. This may be readily accomplished by means of a lever fixed to the rod and connected by a cord or the like to one of the jacks or levers of the shedding mechanism employed in the manner clearly shown and described in my co-pending application Ser. No. 403,496 and filed July 22, 1941, now Patent No. 2,317,518. It will be understood that the usual chain or means for controlling the levers of the shedding mechanism will be arranged in a manner well known in the art, in order that the shedding mechanism will operate in proper time relation with other moving parts of the loom. Also the connections between the slackener rods of the above-mentioned application will be arranged in a manner well known to provide the proper amount of movement in the slackener rods.

In order to mechanically sever these cross over or portions of warp joining the woven-in portions of the cross strap warp during the operation of the loom, I provide in the instant embodiment of the invention a mechanism in the form of an attachment generally designated 52 (Fig. 2).

This attachment consists of a base plate 53 on which there is pivotally mounted a bearing block 54 by means of a stud bolt 55 which extends through the block and threadingly engages the base plate. This block has a recess 56 (see Fig. 6) therein slidably receiving a rod 57, which has an extension 58 threadingly secured thereto as at 59 (see Fig. 3) and provided at the free end thereof with an arm 60 to which is secured a knife blade 61. The knife blade 61 may be attached in place in any convenient manner such as by providing a recess 62 in the arm of a dimension to snugly receive the blade 61. The rod

is movable to position the arm 60 between the bandings at a location adjacent to the aforementioned warp portions 81 joining the woven-in portions of the cross strap and is further movable in a direction to engage and sever such warp portions. The rod 57 is also provided with a slot 63 (see Fig. 7) in which a cam follower 64 is pivotally mounted by means of a pin 65 extending through the rod and cam follower. A pull spring 66 has one end secured to the cam follower 64 and the other end thereof anchored by means of a pin 67 secured to the rod 57. This arrangement resiliently holds the cam follower against the stop 68 (see Fig. 5) provided by the edge of the recess 63.

A block 69 having a straight edge 70 and a cam surface 71 is secured to the base plate 53 with screw bolts 72 at one side of the rod 57 with the cam surface 71 and straight edge 70 positioned so as to be engaged by the cam follower 64. This assembly is secured to the breast beam of the loom at a location adjacent to the edge of the webbing to be woven by means of screw bolts 73.

In order to actuate the severing attachment just described in time relation with the motion of the loom, a lever arm 74 having an apertured boss 75 is secured to a rock shaft 76 finding bearing in a bracket 77 extending forwardly from the breast beam 21. This arm 74 is positioned at a location to engage the end extremity 78 of the rod 57 and when swung by the movement of the rock shaft 76 towards the breast beam will push the rod 57 towards the lay of the loom. In moving the rod towards the lay or fell of the webbing, the cam follower 64 will ride upon the cam surface 71 and cause the rod 57 to move in a direction away from the straight edge 70 of the block 69. Further movement of the rod 57 will cause the cam follower 64 to extend beyond the outer edge 79 of the block 69 and permit the rod to be moved laterally to position the arm 60 and the blade 61 carried thereby, between the bandings and adjacent to the cross over or joining warp portions of the cross straps. This lateral movement is caused by the action of a pull spring 80 anchored at one end to the rod 57 and at the other end to the arm 74 at a location thereon at one side of the pivot 55 of the bearing 54 which will exert a pull on the rod 57 in a direction to force the same against the straight edge 70 of the block 69 (see Figs. 3, 4, and 5).

Movement of the arm 74 in the opposite direction will cause the pull spring 80 to exert a resilient force on the rods 57 to withdraw the arm 60 from its forward position between the bandings. This movement of the rod will cause the blade 61 to engage and sever the cross over or joining warp portions 81 of the cross straps 51. In this latter movement of the rod 57 the direction of the force of the pull spring 80 thereon will cause the rod to engage the straight edge 70 and be moved in a straight path relative to the edge of the webbing and this movement of the rod 57 will cause the cam follower to be swung about its pivot 65 by the edge 82 thereof engaging the edge 79 of the block 69. The rod 57 is limited in its forward movement by a pin 57a positioned in the rod 57 to engage the block 54.

In order that the above-described motions may take place in proper time relation with other moving elements of the loom, a lever 83 (see Fig. 1) is pivotally mounted to the side frame 20 as at 84. To the arm 85 of this lever there is pivotally secured a link 86 the other end of which is in turn pivotally secured to a link 87 fixed to and depending from the rock shaft 76. As the lever 83

is caused to be moved about its pivot 84, motion of the arm 85 will be transmitted to the rock shaft 76 through the linkage just described. There is pivotally secured at one end portion to the lower portion of the arm 88 of the lever 83 an elongated member 89 provided with a notch 90 adapted to receive therein the end portion of a narrow plate 91 fastened to the lay sword 27. A lever 92 is pivotally supported from a bracket 93 depending from the side frame 29. On the end of the arm of the lever 92 there extends a pin 93' with the end thereof bent upwardly which, with the adjacent surfaces of the lever, provides a recess in which the member 89 normally rests when inactive to keep the same out of the path of movement of the plate 91. A pull spring 94 is secured at one of its ends to the end portion of the member 89 and its other end is conveniently anchored such as to the floor 95. This lever 92 may be cooperatively connected to the shedding mechanism of the loom by means of a connector 96 and actuated thereby in timed relation with other moving elements of the loom to be swung about its pivot in a direction to position the arm 97 thereof at a location, as illustrated in dot-and-dash lines in Fig. 1 to permit the member 89 at the urging of the spring 94 to be moved to a position at a location to place the notch 90 in the path of movement of the plate 91. During the forward movement of the lay sword 27 the notch will register with and receive therein the extending portion of this plate 91. Movement of the lay sword in the opposite direction will carry the member 89 therewith and swing the lever 83 about its pivot 89 to cause motion in the rocker shaft 76 as above described. The release of the lever 92 will permit the pull spring 93 fixed thereto to move member 89 in a direction to disconnect the notch 90 and plate 91 to permit the return of the lever 83 and connected linkage to its initial position by the force of the pull spring 83a thereon.

It is to be understood that each loom is furnished with a multiplicity of these attachments, there being one for each webbing woven on the loom.

The operation of the several parts of the embodiment of the invention has been given in connection with the description thereof and a brief general description of the operation of the mechanism as a whole will suffice to make clear its mode of operation. It will be assumed that the loom has been set into motion and the weaving of the webbing has reached the stage shown more or less diagrammatically in Fig. 8 wherein the warp of one of the rows of cross straps has been crossed over from the lower banding 42 to the upper banding 34, further action of the loom mechanism will weave in this warp with the warp and weft of the upper banding. After this portion of the warp has been sufficiently woven in then the mechanism which actuates the lever 83 will be set in motion to actuate the linkage which transfers motion from the sword to the rock shaft 76. This will cause a forwardly movement in the arm 74 which will push the rod 57 towards the lay. This movement of the rod will withdraw the arm 60 and blade 61 from between the bandings, where it was previous to this movement, to a position at a location adjacent to the edge of the banding and between the fell of the bandings 42 and 34 and the cross over or joining warp portion of the cross strap. A further movement in the same direction will cause the cam follower 64 to ride beyond the outer edge of the

block 69 and the pull of the spring 80 on the rod will move the rod substantially laterally which will position the arm and its knife blade 61 rearwardly of the aforementioned joining warp portions 81. On the return movement of the arm 74 the pull spring 80 will move the rod 57 and arm 60 towards the breast beam which action will cause the knife blade to engage the portion 81 of the warp and sever the same. The arm 60 and blade 61 will remain between the bandings until again set into motion to repeat the cycle of operation just described.

I claim:

1. In a loom arranged for weaving ladder webbing in which the warps of the cross straps at the completion of each length of cross strap are alternately woven in one and then the other of the bandings of the webbing, means operatively connected to the loom mechanism for operating in time relation therewith for severing the warp portions joining the woven in portions of said cross straps.

2. In a loom arranged for weaving ladder webbing in which the warps of the cross straps at the completion of each length of cross strap are alternately woven in one and then the other of said bandings, cutter means operatively connected to the loom mechanism for operating in time relation therewith for severing the warp portions joining the woven in portions of said cross straps.

3. In a loom arranged for weaving ladder webbing in which the warps of the cross straps at the completion of each length of cross-strap are alternately woven in one and then the other of the bandings of the webbing, severing means for severing the warp portions joining the woven-in portions of said cross straps and means for operatively connecting said severing means to the loom mechanism to operate in time relation therewith.

4. In a loom arranged for weaving ladder webbing in which the warps of the cross straps at the completion of each length of cross straps are alternately woven in one and then the other of the bandings of the webbing, severing means, means for positioning said severing means between said bandings at a location to engage the warp portions joining the ends of said cross-straps and means for moving said severing means in a direction to engage and sever said warp portions.

5. In combination with a loom arranged for weaving ladder webbing in which the warps of the cross straps at the completion of each cross strap are alternately woven-in one and then the other of the bandings of the webbing, means for mechanically severing the warp portions joining the woven-in portion of said cross straps comprising a severing tool, means for positioning said tool between the bandings and means for moving said tool towards and into engagement with said joining warp portions to sever the same.

6. In combination with a loom arranged for weaving ladder webbing in which the warps of the cross straps at the completion of each cross strap are alternately woven-in one and then the other of the bandings of the webbing, means for mechanically severing the warp portions joining the woven-in portion of said cross straps comprising a severing tool, means for positioning said tool between the bandings and means for moving said tool in a direction to engage and sever said joining warp portions.

7. In combination with a loom arranged for weaving ladder webbing in which the warps of the cross straps at the completion of each cross strap

are alternately woven-in one and then the other of the bandings of the webbing, means for mechanically severing the warp portions joining the woven-in portions of said cross straps comprising a severing tool, means for positioning said tool between the bandings and means for moving said tool lengthwise of said bandings into engagement with said joining warp portions to sever the same.

8. In combination with a loom arranged for weaving ladder webbing in which the warps of the cross straps are alternately woven-in one and then the other of the bandings of the webbing, means for mechanically severing the warp portions joining the woven-in portions of said cross straps comprising a rod having a cutting tool at the end thereof, means for moving said rod to position said tool between the bandings of said webbing and means for moving said rod in a direction to move said cutting tool to engage and sever said joining warp portions.

9. In combination with a loom arranged for weaving ladder webbing in which the warps of the cross straps at the completion of each cross strap are alternately woven-in one and then the other of the bandings of the webbing, means for mechanically severing the warp portions joining the woven-in portions of said cross straps com-

prising a rod movably mounted and having a cutting tool thereon, means for moving said rod to position said cutting tool adjacent the said joining warp portions and resilient means for moving said rod in a direction to move said cutting tool to engage and sever said joining warp portions.

10. In a loom arranged for weaving ladder webbing in which warps forming the cross-straps are manipulated to be woven in at the end portions of each cross-strap formed, alternately into one and then the other of the outer bands of the webbing and in which the portions of the said warps which join one woven end portion of a cross strap to the woven portion of an adjacent cross strap extend from one banding to the other, an attachment for said loom for severing the said joining warp portions between the woven-in portions of the cross straps, comprising a rod having a cutting tool thereon arranged to be moved into engagement with the said joining warp portions to sever the same, means for moving said rod including a rock shaft, an arm carried by said rock shaft and positioned to engage said rod, and means for rocking said shaft to move said

25 arm.

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