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2,469,202

LOOM ATTACHMENT FOR WEAVING LADDER WEBBING

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3 Sheets-Sheet 2

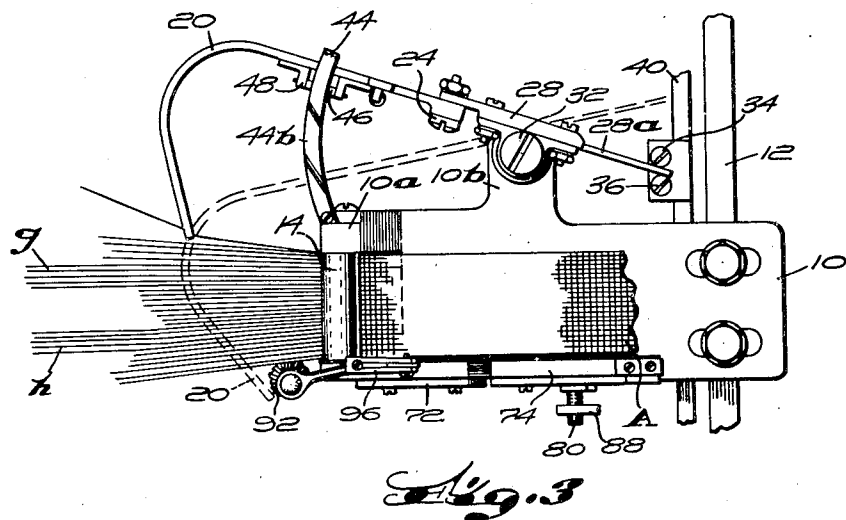


Fig. 3

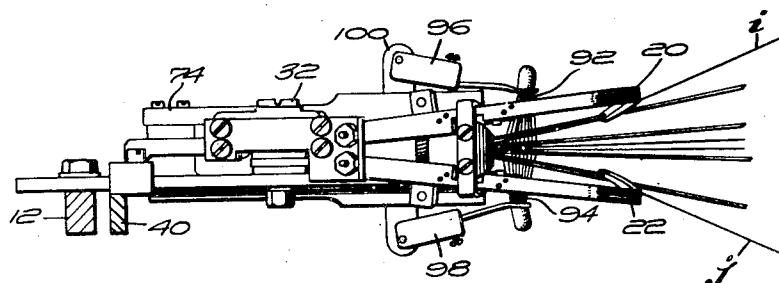


Fig. 4

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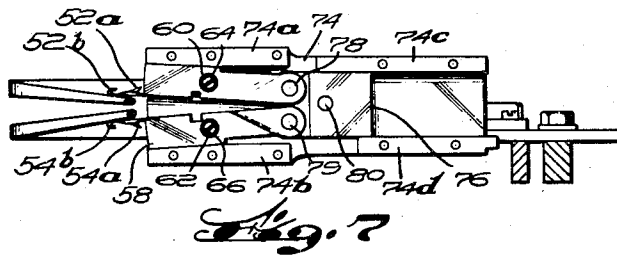
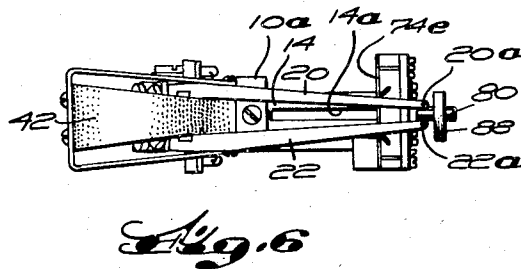
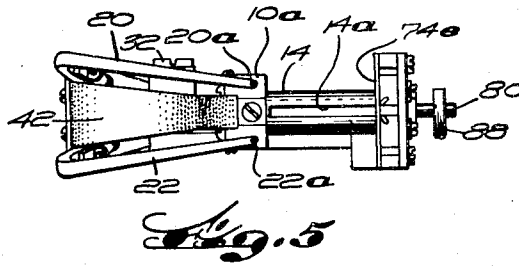
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LOOM ATTACHMENT FOR WEAVING
LADDER WEBBINGFrederick D. Murdock, Barrington, and John A.
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4 Claims. (Cl. 139—124)

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This invention relates to improvements in a loom attachment for weaving ladder webbing. More especially it has to do with an attachment whereby ladder web can be woven on a loom having a so-called stationary weft supply such as a spool or bobbin wound with yarn.

Ladder web is made for use in Venetian blinds and has two main tapes which are woven simultaneously and two systems of cross threads which generally extend parallel to the warp threads of the main tapes and at predetermined areas are interwoven with first one and then the other of the main tapes. Thus at all times during the formation of the ladder web there are two sheds, one for each main tape, and during the binding-in of the cross threads to a main tape there is what may be deemed an additional shed formed by the warp threads of the main tape and the threads of one of the systems of cross threads. This multiplicity of sheds makes it necessary to insert the filling threads in such manner that there will be no interference with the numerous warp threads and the systems of cross threads. To accomplish this, the present invention resides in an improved attachment of the type disclosed in the Clutson Patents, No. 2,130,636 of September 20, 1938, No. 2,229,011 of January 14, 1941, and No. 2,258,538 of October 7, 1941.

The primary object of the present invention is to provide improved mechanism for effecting the desired movements of a pair of thread arms carrying the filling threads and a pair of needles which co-operate with the said arms to the end that ladder web may be woven on a loom without employing any shuttles and have a knitted selvage at both edges of the main tapes.

The best mode in which we have contemplated applying the principles of our invention is shown in the accompanying drawings, but these are to be deemed illustrative for it is intended that the patent shall cover by suitable expression in the appended claims whatever features of patentable novelty exist in the improvements disclosed.

In the accompanying drawings:

Fig. 1 is a perspective of an attachment embodying the present improvements;

Fig. 2 is a side elevation;

Fig. 3 is a plan;

Fig. 4 is an elevation of the side opposite to that shown in Fig. 2;

Fig. 5 is an end view showing the thread arms at one end of their travel;

Fig. 6 is a view like Fig. 5 but showing the thread arms at the other end of their travel; and

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Fig. 7 is a side view, similar to Fig. 2, but with some parts removed.

Referring now to the drawings, and more particularly to Fig. 1, the woven ladder web A with its upper and lower main tapes *a* and *b* is shown lying along the top surface of a base 10 which is secured to some fixed member 12 of a loom. The woven web extends from a guide 14 which is secured to an upstanding bracket portion 10*a* of the base 10. This guide has a slot 14*a* (see Fig. 5) from the front edge of which various warp threads extend to the slay 18 of the loom. The warp threads *c* and *d* of the upper tape *a* form one shed and the warp threads *e* and *f* of the lower tape *b* form another shed. Between these two sheds extend two separated systems of other warp threads *g* and *h*, one system being near one edge of the web and the other system near the opposite edge (see Fig. 3). At predetermined intervals, these warp threads *g* and *h* are interwoven alternately with the threads of the upper and lower main tapes to form so-called stitching areas. Between these areas, the warp threads *g* and *h* extend or float between the main tapes to form the ladders or so-called cross threads of the web. At each stitching area the warp threads of one or the other of the systems *g* and *h* are shifted so as to form an additional shed, more or less coincident with the shed of a main tape, so that the filling thread of the main tape will interweave with the so-called cross threads and bind them to the main tape.

The filling threads *i* and *j* of the main tapes are drawn from the bobbins or spools (not shown) and threaded through the eyes 20*a* and 22*a* of a pair of thread arms 20, 22 respectively. These thread arms are pivotally mounted by studs 24 and 26 on a bracket plate 28 secured to a bracket 30 that in turn is pivotally attached by a shoulder screw 32 to an off-set arm 10*b* of the base 10. An elongated arm 28*a* of the bracket plate projects between a pair of screws 34, 36 upstanding from a block 38 mounted on a slide bar 40 of the loom. As the slide bar reciprocates, the thread arms 20 and 22 are caused to swing about the axis of the shoulder screw 32, and thus carry the respective filling threads *i* and *j* from one edge of the tapes to the other.

In addition to this horizontal swinging movement of the thread arms caused by the reciprocation of the slide bar 40, it is a feature of the present improvements that the arms are simultaneously caused to swing vertically about the axes of studs 24 and 26. The combined swinging movements of the arms bring their eyes 20*a* and

22a at the end of their counterclockwise swing across the sheds closely together as seen in Fig. 2. The vertical movement of the thread arms is effected by a cam 42 which is secured at its inner end to the bracket portion 10a of the base and at its outer end is supported by elongated U-shaped bracket bar 44 whose head portion 44a is secured to the cam and whose legs 44b and 44c are secured at their ends to the bracket portion 10a.

Each thread arm is preferably provided with a roller 46 which lies between the cam 42 and a leg 44b or 44c of the bracket bar, each roller being supported by a suitable bracket 48 attached to the respective thread arm. As the thread arms are swung counter-clockwise by the movement of the slide bar 40, the rollers 46 roll along the opposite faces of the cam 42 being urged thereagainst by a tension spring 50 whose ends are secured to the two thread arms. During the clockwise swing of the thread arms the rollers likewise roll along the cam faces which cause the arms to spread apart in a vertical direction.

This combined horizontal and vertical swinging movement of the thread arms is important because it enables the eye ends of the arms to pass into the rather shallow sheds formed by the warp threads c and d and e and f of the main tapes, and the additional sheds formed at times by the warp threads g and h of the systems of cross threads. These sheds are formed rather rapidly and, as just noted, are rather shallow but nevertheless the described movement of the thread arms enables them to enter and pass through the sheds and then be withdrawn without interference with the numerous warp threads of the main tapes and cross threads.

As the filling threads are carried through the sheds in the counterclockwise swing of the thread arms, they are brought into engagement with a pair of needles 52 and 54. Each needle is preferably of the type having a latch, 52a and 54a, which, when a needle is moved forward, is swung to open position as seen in Fig. 2. This enables the filling thread carried by a thread arm to slip past the hook, 52b and 54b of the needle as the arm nears the end of its counter-clockwise swing and then engage the hook as the thread arm begins its return or clockwise movement. Thereupon the needle is moved rearward and during this movement its latch swings over onto the hook to form an eye in which the filling thread just received there is retained, while a filling thread previously laid in the hook (and then withdrawn therefrom and slipped along over the open latch during the forward movement of the needle) can now slip over the closed latch and off the needle to be drawn tight against the edge warp threads of a tape.

The forward and rearward movements of the needles must be accurately timed with the movement of the thread arms and in addition each needle must be vertically displaced to bring its hook into position to be engaged by a filling thread. The needles 52 and 54 are separately mounted at the ends of needle bars or holders 56 and 58 which have outstanding studs 60 and 62 carrying rollers 64 and 66 (see Figs. 2 and 7). These rollers roll in cam slots 68, 70 of a cam plate 72 secured to a plate 74 mounted on the base 10. At the top and bottom edges of this plate 74 are guide strips 74a, 74b, 74c and 74d (see Fig. 7). The strips 74a and 74b are shaped to conform to the oscillatory movements of the needle holders 56 and 58 as determined by the cam slots 68 and 70. The strips 74c and 74d constitute

guides for a slide 76 to which the needle holders are pivotally attached by stub shafts 78 and 79. The slide 76 carries an outstanding stud 80, on which is a roller 82 which can roll on the surfaces of a slot 84 in a plate 86 that is attached to the plate 74. The stud 80 is connected by links 88 and 90 with a rockshaft (not shown) of the loom.

As the needle holders are moved toward the left, as seen in Fig. 1, the needles 52 and 54 are at first moved slightly toward one another to cause the filling thread that is within each hook to move outward therefrom and push the respective latches 52a and 54a rearward on the needles as the latter slides along the loops of the filling threads. This movement of the latches is also augmented by brushes 92, 94 carried by pivoted arms 96 and 98 mounted on a fixed cross plate 100. These brushes are normally held in position to be engaged by the latches as the needles move forward. When the filling thread loops are clear of the hook, the needles then begin to separate, due to the shape of the cam slots 68 and 70, and are thus brought into position at the ends of their leftward movement to present the open hooks of the needles ahead of the new filling threads that are being laid by the thread arms. These positions of the needles are shown in Fig. 2. As the thread arms begin their clockwise swing, the respective filling threads engage the hooks of the needles and are thereby retained as the filling threads are laid across the sheds between the warp threads during the clockwise swing of the thread arms.

While the thread arms are completing their clockwise swing, the needles are moved to the right, as seen in Fig. 2, carrying with them the newly laid filling threads. The latches are returned to engagement with the hooks of the needles to form an eye in which the newly laid filling threads are retained as the needles continue to move to the right. The loops of the previously laid filling threads still around the needles are held against return movement with the needles by the face 74e of the plate 74, and as a result these previously laid filling threads slip off the needles and engage the warp threads at the edges of the respective tapes, thus forming a knitted selvage edge on each tape of the ladder web. The movement of the needles is so timed that the filling threads slip off before the thread arms have completed their clockwise swing, thus enabling the filling thread to be drawn snugly against the warp threads of the tapes.

We claim:

1. An attachment for looms having stationary weft supplies and adapted to weave ladder web, a pair of thread arms for carrying weft threads back and forth through separate sheds of warp threads, a pair of reciprocally movable needles arranged to operate with said thread arms, cam means associated with said thread arms, for causing said arms to move toward one another as they carry the weft threads in one direction through the sheds and to move away from one another as they carry the weft threads in the other direction through the sheds, and other cam means associated with said needles for causing said needles to move away from one another as they move forward into cooperative action with said thread arms to bring the eye of each needle between a thread arm and the weft thread carried thereby.

2. An attachment for looms having stationary weft supplies and adapted to weave ladder web, a pair of thread arms for carrying weft threads

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back and forth through separate sheds of warp threads, a common axis about which both arms are swung during operation of the loom, a bracket movable about said common axis, and other axes carried by said bracket about which other axes the thread arms are swung toward and away from each other as they are swung about their common axis, and cam means controlling the swing of said arms about said other axes and so disposed as to cause said arms to approach one another during one direction of swing about the common axis, and to move apart during the reverse direction of swing about the common axis.

3. An attachment for looms having stationary weft supplies and adapted to weave ladder web, a pair of thread arms for carrying weft threads back and forth through separate sheds of warp threads, a bracket for said thread arms rotatable about the axis of a fixed pivot on said loom, and carrying a pair of pivots with axes arranged at right angles to the axis of said fixed pivot, said thread arms being separately rotatable about the axes of said pair of pivots while rotating together about the axis of said fixed pivot; and a V-shaped cam mounted on said loom between said thread arms for engagement thereby, the said cam being so disposed that as the thread arms swing in one direction of rotation about the axis of said fixed pivot they are caused to move toward one another while rotating about the axes of said pair of pivots, and as the thread

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arms swing in the opposite direction of rotation about the axis of said fixed pivot they are caused to move away from one another while rotating about the axes of said pair of pivots; there being means for maintaining the said thread arms in contact with the effective surfaces of said V-shaped cam.

4. An attachment for looms having stationary weft supplies and adapted to weave ladder web, a pair of thread arms carrying separate weft threads back and forth between separate sheds of warp threads to weave simultaneously the main tapes of said web; means for swinging said thread arms together across said sheds and simultaneously swinging the arms toward one another to bring the eyes of said arms opposite the inner portion of the respective sheds upon the completion of the swing of said arms in one crosswise direction of movement; a pair of needles mounted for reciprocal movement beside the edges of said sheds whereat the eyes of said needles are brought closest together; and means controlling the reciprocal movement of said needles to bring them at one end of their stroke respectively above and below the said thread arms and between a thread arm and the weft thread carried thereby.

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