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C. VILLA ET AL

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SHUTTLELESS LOOM WITH CONTINUOUS WEFT SUPPLY

Filed June 24, 1949

2 Sheets-Sheet 1

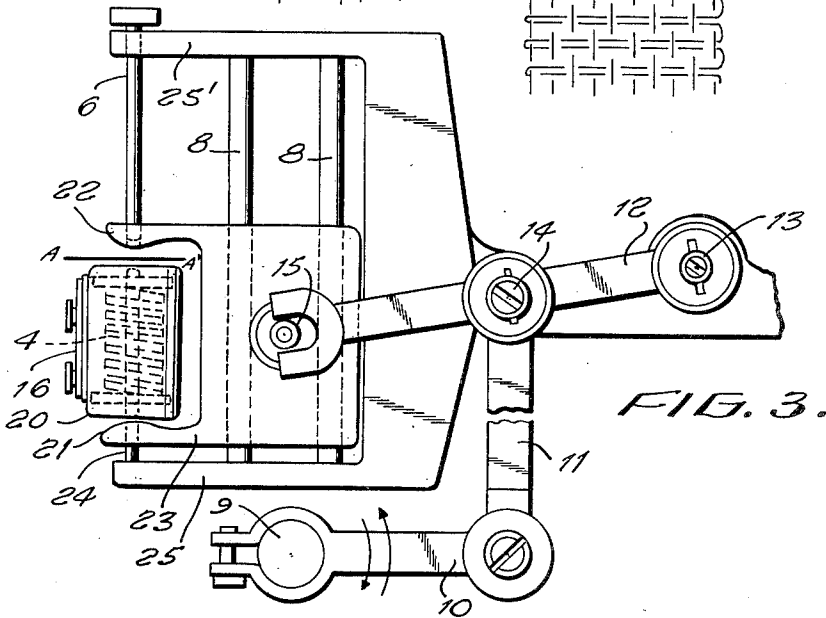
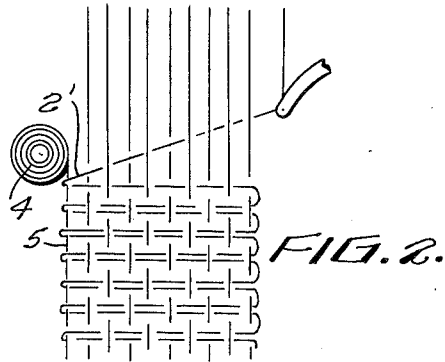
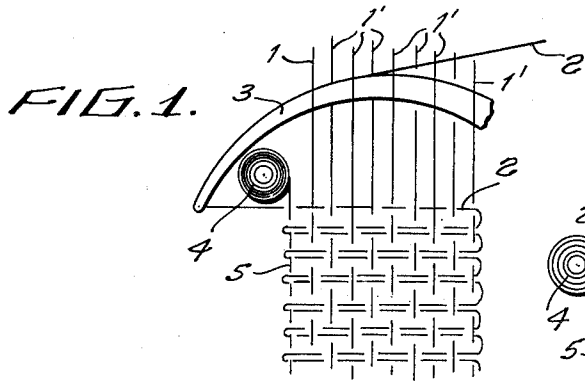


FIG. 3.

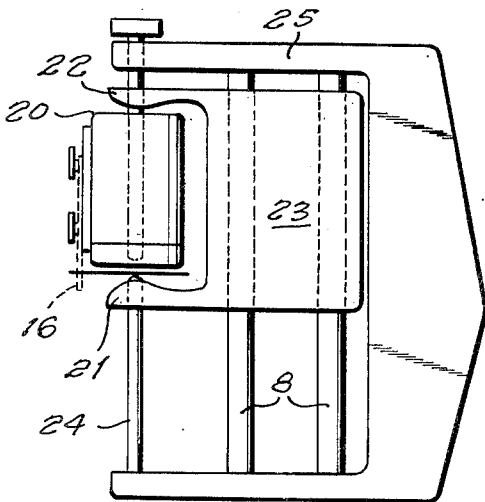


FIG. 4.

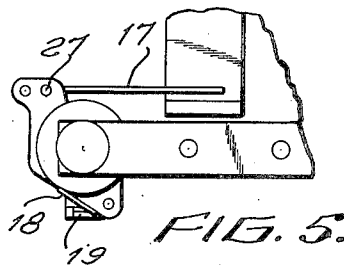


FIG. 5.

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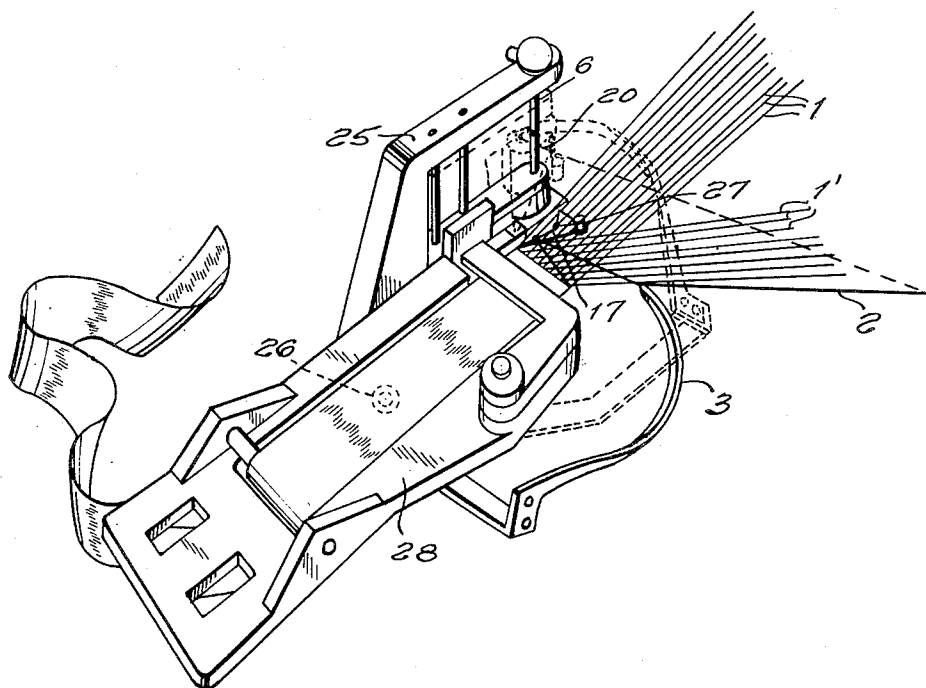


FIG. 6.

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UNITED STATES PATENT OFFICE

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SHUTTLELESS LOOM WITH CONTINUOUS WEFT SUPPLY

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3 Claims. (Cl. 139—124)

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The present invention relates to shuttleless looms with continuous weft supply, and more particularly to an arrangement for inserting a binding warp thread through the loops formed at one longitudinal edge of a fabric by a reciprocated loop forming arm.

Shuttleless looms are known in which loop forming arm passes from one side through the sheds formed by the warp threads to the other side to form weft loops, the weft thread being supplied continuously from a spool. Such weft loops are tied at the other side of the fabric, however, the known devices are incapable of forming a straight selvage.

It is the object of the present invention to provide a shuttleless loom construction in which the weft loops are tied by the outermost warp thread.

It is another object of the present invention to provide a loop forming arm reciprocated in a single plane, and a device moving a bobbin supplying a binding warp thread transverse to the weaving plane and through the loops formed by the loop forming arm.

With these objects in view the present invention mainly consists in a loom and comprises a reciprocated weft loop forming arm adapted to pass transversely through the sheds formed in a set of parallel longitudinally extending warps. The loop forming arm has a free end portion carrying the weft and is movable between a retracted position located on one side of the set of warps and an advanced loop forming position in which the free end thereof projects beyond the other side of the set of warps so as to form a weft loop portion projecting beyond the other side of the set of warps. On this other side of the set of warps a guiding means is provided which extends normal to the weaving plane defined by the warps and by the movable arm. A movable carriage is mounted on the loom movable in two opposite directions normal to the weaving plane. The binding warp thread is supplied by a bobbin rotatably mounted on a bobbin carrying means which is mounted slidable on the guiding means between projecting arms of the carriage.

When the carriage is moved normal to the weaving plane, the bobbin carrying means is taken along and passes through the weft loop end portions formed by the reciprocated arm.

In order to permit the transversal movement of the loop forming arm, the bobbin carrying means are shorter than the distance between the projecting arms of the carriage so that a gap is formed between the bobbin carrying means and the projecting arm of the carriage which is located forwardly in the direction of movement of the carriage.

The guide means are preferably two coaxial

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rods having free ends spaced a short distance from each other and from the weaving plane so as to define a gap permitting passing of the loop forming arm, and coinciding during operation of the loop forming arm with the gap formed between the bobbin carrying means and one arm of the carriage.

The arrangement of the present invention is particularly suitable for narrow fabrics such as ribbons, braids, trimmings and the like, but can as well be applied to looms serving for the manufacture of elastic or non-elastic fabric for corsets, girdles and garter belts. Several devices of the type described may be provided on a loom for simultaneous operation.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a schematic plan view showing the arrangement of the present invention with the loop forming arm in advanced position;

Fig. 2 is a view similar to Fig. 1 showing the loop forming arm in retracted position;

Fig. 3 is a side elevation of a preferred embodiment of the present invention;

Fig. 4 is a view similar to Fig. 3 showing a different position of the bobbin carrying means;

Fig. 5 is a plan view of an auxiliary device; and

Fig. 6 is a perspective view of an arrangement according to the present invention.

Referring now to the drawings and more particularly to Figs. 1 and 6, the loop forming arm 3 passes transversely through the sheds formed by the loops of warps 1 and 1', and pulls the weft 2 from a spool, not shown. During reciprocation of the arm 3 between the positions shown in Figs. 1 and 2, weft loops are formed which have end portions 2'. The binding thread 5 is inserted into the loops 2' and is supplied by a bobbin 4. The bobbin 4 must pass through a weft loop formed by the arm 3 while the same is in its advanced position shown in Fig. 1, whereupon the arm returns to the retracted position shown in Fig. 2.

After the loop forming arm has been retracted, a reed, not shown, places the last formed weft in proper position whereupon the warp shed closes.

According to the present invention the loop forming arm 3 moves in the weaving plane defined by the warp threads so that the bobbin 4 must move in a direction perpendicular thereto. In the preferred embodiment of the present

invention shown in Figs. 3 and 4, A—A' indicates the weaving plane in which the loop forming arm moves, and in which the warp threads are located. A bobbin carrying means 20 supports bobbin 4 rotatable, but slightly braked, and carrying the winding thread 5. The tension of the thread 5 is adjusted by well known braking means which are not an object of the present invention.

The bobbin carrying means 20 is slidably arranged on a guiding means composed of two coaxial rods 6 and 24 which are supported on supporting arms 25, 25'. The free end of the rods 6 and 24 are spaced from each other and from the weaving plane A—A' and form a gap through which the loop forming arm, and a weft thread supplied by the same can pass. A carriage means 23 is slidably mounted on a pair of guiding rods 8, and also on the coaxial rods 6 and 24 which pass through coaxial bores in the projecting arms 22 and 21. The length of the bobbin carrying means is slightly shorter than the distance between the arms 21 and 22 so that when the bobbin carrying means engages with one end thereof one of the arms 21, 22, a gap is formed between the other end of the bobbin carrying means and the other of the arms 21, 22.

The carriage means 21, 22, 23 are provided with a pin 15 projecting into the fork-shaped end of a lever 12 which is pivotally mounted on a shaft 13 and reciprocated through the connecting rod 11 by the swinging lever 10 secured to the rocking shaft 9 which derives its motion from the loom drive.

The device operates in the following manner:

When the lever 12 moves the carriage 23 to its lowermost position, the bobbin carrying means 12 is taken along by the arm 22 which moves into the gap between the guiding rods 6 and 24 so that the upper end of the bobbin carrying means 20 clears the gap and is below the weaving plane. During the consecutive upward movement of the carriage 23 the arms 21 and 22 assume the position shown in Fig. 3 in which the gap between the bobbin carrying means 20 and the arm 22 coincides with the gap between the guiding rods 6 and 24. In this position of the elements the loop forming arm 3 and the weft thread 2 can move through the coinciding gaps between the positions shown in Figs. 1 and 2.

The carriage 23 continues the upward movement to an upper end position in which the bobbin carrying means clears the gap between the guiding rods 6 and 24. To obtain this position the arm 21 moves into the gap.

During the consecutive downward movement the arm 22 moves for a short distance before engaging the bobbin carrying means 20, see Fig. 3, and in this position the gap between the bobbin carrying means 20 and the arm 21 coincides with a gap between the guiding rods 6 and 24, permitting passing of the loop forming arm 3 into the retracted position shown in Fig. 2, in which the weft loop is secured by the binding thread 5 which was inserted into the projecting loop portion 2' while the bobbin 4 passed through the weaving plane as above described.

In the event that the weaving plane is vertical and the carriage 23 moves horizontal, the bobbin carrying means 20 will not move on the rods 6 and 24, respectively, unless pushed by an arm of the carriage. If, however, the guiding means 6 and 24 are vertical, the bobbin carrying means 20 will have a tendency to drop from the position shown in Fig. 4 and close the gap. How-

ever, since the binding thread 5 supplied by the bobbin has a certain tension, the pull of the binding thread on the bobbin and on the bobbin carrying means will have a transverse component pressing the bobbin carrying means against the guiding rod 6 so that the bobbin carrying means is held on the rod 6 and prevented by friction to drop from the position shown in Fig. 4.

The guiding rod 6 can be removed from the arm 25 for the insertion of a new bobbin. A threaded guide 16 is also attached to the bobbin carrying means and is held in the position shown in Fig. 3 by the binding thread passing through an eye therein. If a binding thread breaks, the guiding means 16 drops to the position shown in Fig. 6 blocking passing of the weft loop carried by the loop forming arm 3 through the gap between rods 6 and 24. The weft thread is then cut by the blade members 18, 19. Suitable means may be provided for indicating such breaking of the thread.

In order to assure a straight selvedge of the fabric, and to prevent that the binding thread 5 is indented by the pull of the weft loops, the bobbin carrying means are provided with a copper wire pivotally mounted on a pin 27 on the bobbin carrying means and extending parallel to the binding thread 5 through the last formed weft loops.

The arrangement according to the present invention may be operated in the following three manners:

(a) The bobbin 4 is in the lower position while the loop forming arm passes through the gap, whereupon the bobbin 4 moves to its upper position and the loop forming arm is retracted. Then the bobbin returns to its lower position.

(b) The bobbin 4 is in the upper position while the loop forming arm moves to its advanced position, then is lowered through the loop whereupon the arm returns to retracted position. Then the bobbin is returned to its upper position.

(c) The bobbin 4 may be in the upper or lower position. The loop forming arm moves to advanced position and the bobbin passes through the weft loop. Now the arm is returned to retracted position, and then again moves to advanced position whereupon the bobbin is moved to the other position thereof.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of shuttleless looms differing from the types described above.

While the invention has been illustrated and described as embodied in a bobbin carrying means transversely shifting a bobbin through loops formed by a reciprocating arm, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a loom, in combination, a reciprocating

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weft loop forming arm adapted to pass transversely through sheds in a set of parallel longitudinally extending warps and having a free weft loop carrying end portion movable between a retracted position located on one side of said set of parallel warps to an advanced loop-forming position projecting beyond the other side of said set of warps so as to form a weft loop portion projecting beyond said other side of said set of warps; a guiding means composed of two coaxial rods extending normal to the weaving plane defined by said set of warps and said weft loops, and located on said other side of said set of warps with the common axis of said two coaxial rods adapted to pass through a projecting weft loop portion formed by said weft loop-forming arm, said coaxial rods having free ends spaced a short distance from each other and from said weaving plane so as to define a gap permitting passing of said weft loop forming arm; movable carriage means having two spaced projecting arms, each of said arms formed with a bore at the free end thereof, said bores being coaxial, said carriage means being mounted on said loom movably in two opposite directions normal to said weaving plane with said guiding means passing through said bores; a bobbin-carrying means for weaving a binding thread into said weft loop end portions of said weft loops mounted axially slidably on said guiding means between said projecting arms of said movable carriage means so as to be taken along by the same during movement thereof so as to pass through said weft loop end portions, said bobbin-carrying means having a length shorter than the distance between said projecting arm of said carriage means so that a gap is formed between said bobbin-carrying means and the respective projecting arm of said carriage means located forwardly in the direction of movement of said carriage means, said gap coinciding with said above-mentioned gap between said free ends of said coaxial rods of said guiding means so as to permit said weft loop carrying end portion of said weft loop forming arm to pass through said coinciding gaps and to form a weft loop end portion adapted for the passing of said bobbin-carrying means; and means for reciprocating said carriage means.

2. In a loom, in combination, a horizontally reciprocating weft loop forming arm adapted to pass transversely through sheds in a set of horizontal parallel longitudinally extending warps and having a free weft loop carrying end portion movable between a retracted position located on one side of said set of parallel warps to an advanced loop-forming position projecting beyond the other side of said set of warps so as to form a weft loop portion projecting beyond said other side of said set of warps; a vertical guiding means composed of two coaxial rods extending normal to the weaving plane defined by said set of warps and said weft loops, and located on said other side of said set of warps with the common axis of said two coaxial rods adapted to pass through a projecting weft loop portion formed by said weft loop-forming arm, said coaxial rods having free ends spaced a short distance from each other and from said weaving plane so as to define a gap permitting passing of said weft loop forming arm; movable carriage means having two spaced projecting arms, each of said arms formed with a bore at the free end thereof, said bores being coaxial, said carriage means being mounted on said loom movably in two opposite vertical directions normal to said

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weaving plane with said guiding means passing through said bores; a bobbin-carrying means for weaving a binding thread into said weft loop end portions of said weft loops mounted axially slidably on said guiding means between said projecting arms of said movable carriage means so as to be taken along by the same during movement thereof so as to pass through said weft loop end portions, said bobbin-carrying means having a length shorter than the distance between said projecting arm of said carriage means so that a gap is formed between said bobbin-carrying means and the respective projecting arm of said carriage means located forwardly in the direction of movement of said carriage means, said gap coinciding with said above-mentioned gap between said free ends of said coaxial rods of said guiding means so as to permit said weft loop carrying end portion of said weft loop forming arm to pass through said coinciding gaps and to form a weft loop end portion adapted for the passing of said bobbin-carrying means, said bobbin-carrying means being frictionally held on said guiding means in raised position against the action of gravity by the pull of said binding thread until taken along by the upper projecting arm during downward movement of said carriage means; and means for reciprocating said carriage means.

3. In a loom, in combination, a reciprocating weft loop forming arm adapted to pass transversely through sheds in a set of parallel longitudinally extending warps and having a free weft loop carrying end portion movable between a retracted position located on one side of said set of parallel warps to an advanced loop-forming position projecting beyond the other side of said set of warps so as to form a weft loop portion projecting beyond said other side of said set of warps; an elongated guiding means located on said other side of said set of warps extending normal to the plane defined by the same; a movable carriage means having two spaced projecting arms and being mounted on said loom guided on said guiding means movably into opposite directions; a bobbin-carrying means for weaving a binding thread into said weft loop end portions mounted slidably on said guiding means between said projecting arms of said carriage means so as to be taken along by the same during movement thereof and adapted to pass through said weft loop end portions, said bobbin-carrying means having a length shorter than the distance between said projecting arms of said carriage means so that a gap is formed between said bobbin-carrying means and the respective projecting arm of said carriage means located forwardly in the direction of movement of said carriage means, said gap permitting said free weft loop carrying end portion of said weft loop forming arm to pass therethrough and to form a weft loop end portion adapted for the passing of said bobbin-carrying means; and means for reciprocating said carriage means.

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