United States Patent

[11] 3,601,160

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[21] Appl. No. 857,093
[22] Filed Sept. 11, 1969
[45] Patented Aug. 24, 1971
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[54] MAGNETIC LATCH HOLDING MEANS FOR A SELVAGE KNITTING NEEDLE IN A NARROW WARE LOOM

5 Claims, 4 Drawing Figs.

[52] U.S. Cl. ..... 139/124 A, 66/111
[51] Int. Cl. D03d 47/42
[50] Field of Search ..... 139/124 R, 124 A; 66/111

[56] References Cited

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2,997,866	8/1961	Ashe et al.	66/111
3,288,172	11/1966	Johnson	139/124 A
3,320,980	5/1967	Gustauson	139/124 R
3,403,706	10/1968	Shackleton	139/124 A

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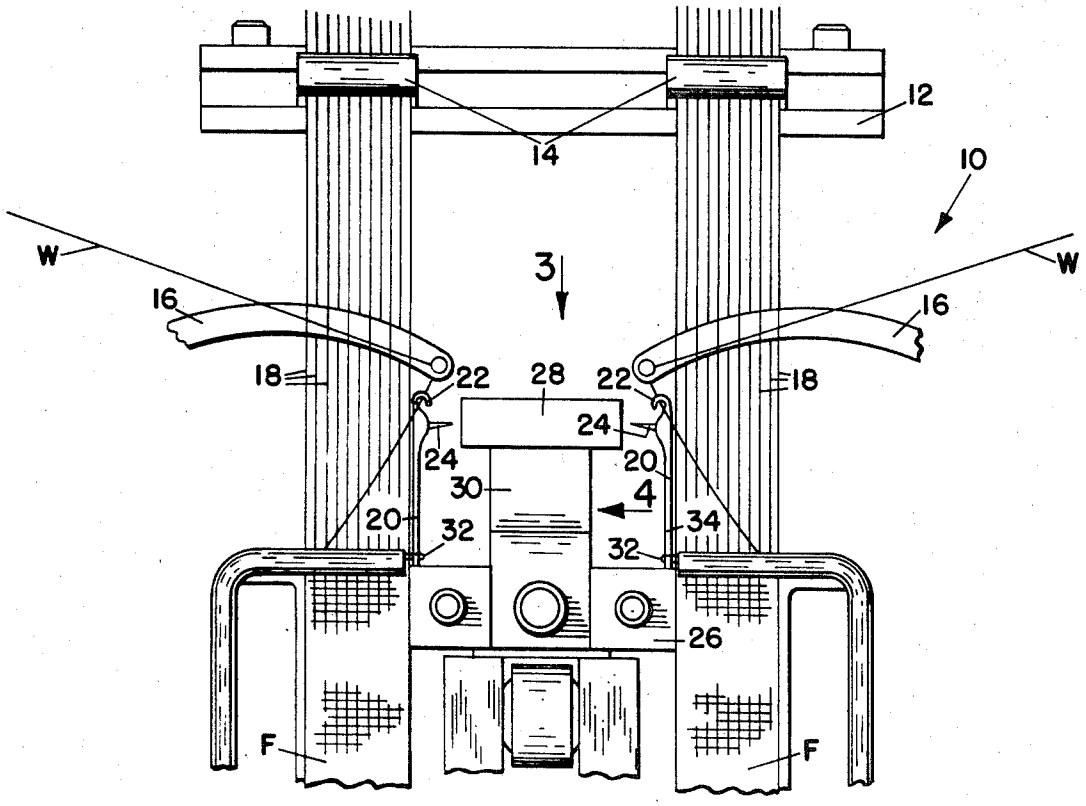
ABSTRACT: A holding means for the latch of a reciprocating selvage knitting needle in a narrow ware needle loom in which the knitting needle has a hook and a latch movable between an open position and a closed position with respect to the hook. The holding means is a magnet positioned for reciprocation with the knitting needle and positioned adjacent to the latch for holding the latch in the open position.



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SHEET 1 OF 2

FIG. 1

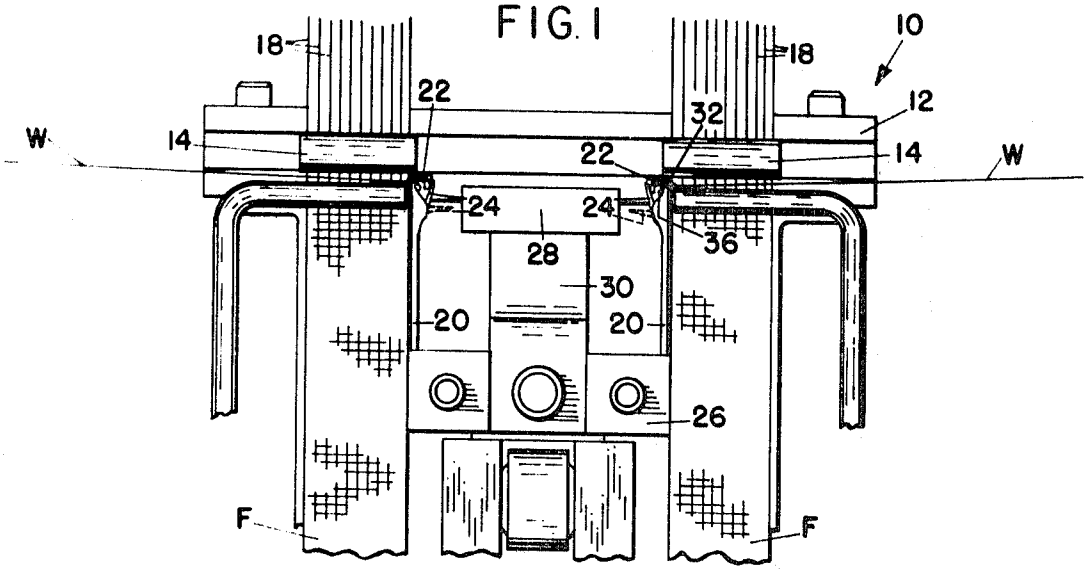

FIG. 2

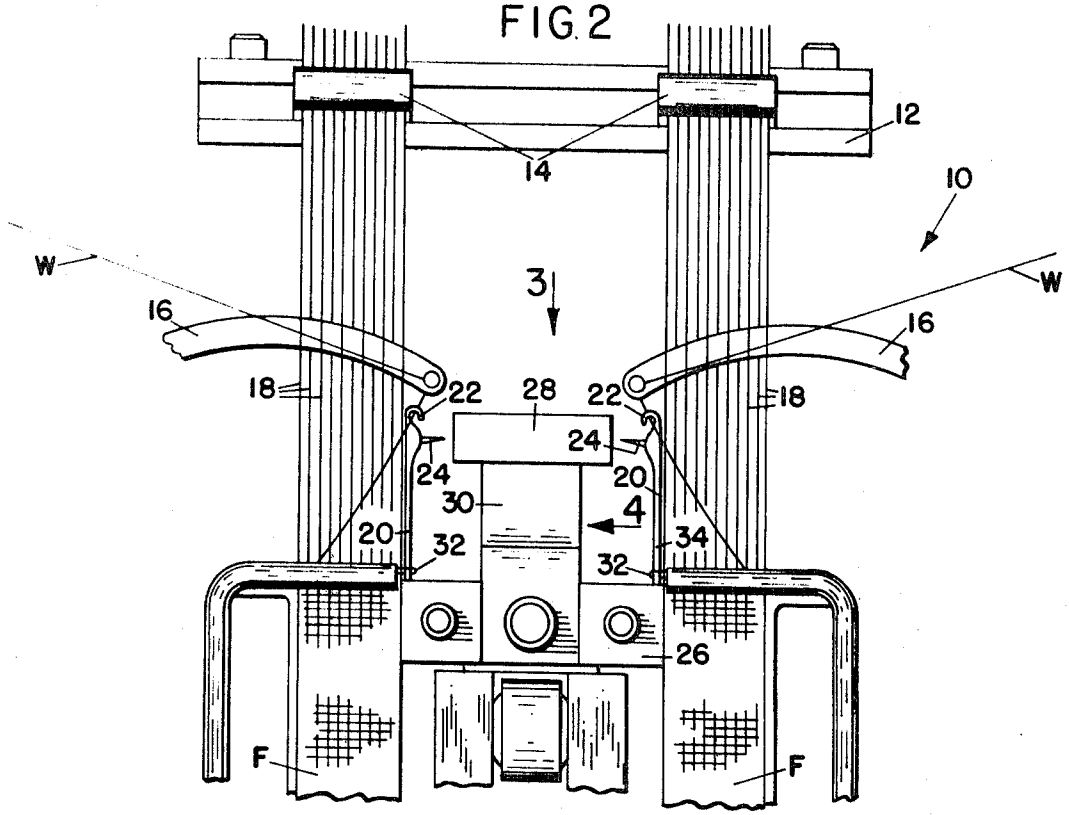

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FIG. 3

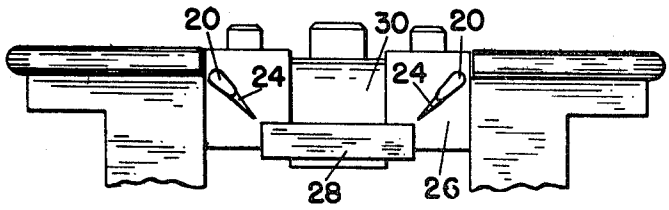
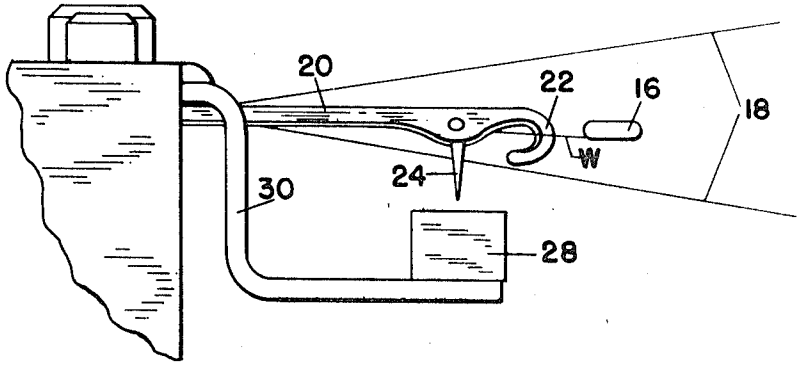


FIG. 4



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MAGNETIC LATCH HOLDING MEANS FOR A SELVAGE KNITTING NEEDLE IN A NARROW WARE LOOM

This invention relates to latch-holding means for a selvage forming knitting needle in a narrow fabric needle loom. In this type of loom, the weft is inserted in successive sheds from a stationary supply source in the form of loops by a weft inserting needle. The ends of the weft loops are secured by the use of a reciprocating knitting needle. The weft loop ends may be secured by knitting the weft loops together, by knitting a chain of loops from a catch cord through the weft loops or by knitting the weft loops and catch cord together.

During each weft insertion, the knitting needle is reciprocated from a rearward position where a knitting loop is picked up by the knitting needle to a forward position where this loop is pulled through the previous knitting loop. This latter position is generally referred to as the "castoff" position, indicating the previous knitting loop is "cast off" the knitting needle.

The knitting needle has a hook positioned for engaging each knitting loop and a pivoted latch which can be moved from a closed to an open position with respect to the hook. The latch is moved to the closed position by the pressure of the previous knitting loop as the newest knitting loop is being pulled through the previous knitting loop. When the latch is thus closed, the hook will be guarded and the newest knitting loop will be pulled through the previous knitting loop without any interference. When the knitting needle moves rearwardly to pick up another knitting loop, the latch is frictionally opened by the last knitting loop.

The motion of the knitting needle is such that there is a deceleration of the needle between the point where the latch is opened and where the next knitting loop is caught by the knitting needle. This deceleration causes the latch to swing to the closed position and cause the knitting needle to miss the next knitting loop.

One solution to the above problem has been to position a friction means which will engage the latch just before the knitting needle picks up the next knitting loop to insure that the latch will be in the open position. This type of latch opening device is shown in assignee's own U.S. Pat. No. 3,403,706, in the name of J. D. Shackleton, Jr., et al.

This solution has certain disadvantages. One of these is that the friction device has to be critically positioned, otherwise the needle may strike the device and be damaged or may miss it so that the latch will not be opened. Another disadvantage is that the latch will wear, thus reducing the life of the needle.

SUMMARY OF THE INVENTION

The principal object of the present invention is to provide a latch-holding means which will overcome all of the above disadvantages; and which is reliable, easy to install, and inexpensive.

The principal object of the present invention is accomplished by providing a magnet adjacent to the latch of the knitting needle and which is mounted for reciprocation with the knitting needle. The magnet is of sufficient strength and near enough to the latch to hold it in the open position. The magnet must be strong enough to overcome the inertial forces of the latch during operation of the loom. Although the latch has a small mass, the extremely high speeds of modern needle looms create a high inertial force on the latch needle. To gain maximum effect from the magnet, it must be positioned so that it is intersected by the plane in which the latch of the knitting needle moves. A bar magnet is preferred over a horseshoe magnet because of the larger effective magnetic field. It is well known that a horseshoe magnet has a greater attracting power than a comparable bar magnet but this is due to the concentration of the magnetic field in a small area between the two ends or poles of the magnet. The magnetic field of the bar magnet extends around the entire bar and is, therefore, much easier to position with respect to the latch. The bar magnet is particularly useful in a double fabric loom wherein the ends of the bar magnet can be positioned adjacent the respective latches of the knitting needles for both fabrics.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become more apparent from the following description when read in conjunction with the accompanying drawings in which:

FIG. **1** is a fragmentary plan view showing the invention as applied to a double fabric needle loom in which the knitting needles are in their forward or castoff position, parts being broken away;

FIG. **2** is a view similar to FIG. **1** but showing the knitting needles in their rearward or pickup position and showing the latches being held in the open position by the latch holding magnet of the present invention;

FIG. **3** is a rear elevation looking in the direction of arrow **3** in FIG. **2**; and

FIG. **4** is a fragmentary side elevation, on an enlarged scale, looking in the direction of arrow **4** in FIG. **2**.

DETAILED DESCRIPTION

Referring to FIGS. **1** and **2**, the loom to which the invention is applied is generally indicated at **10**. The loom shown is a two-space needle loom capable of weaving two fabrics side by side, but it is to be understood that the invention is also applicable to a single-space loom. The loom includes a lay **12** mounting a pair of beat-up reeds **14**, one for each fabric, which are indicated at F. There is a pair of weft inserters **16** for inserting loops of weft W into warp sheds **18** for producing the fabrics F. The means for forming the warp sheds are not shown but are well known and can be seen in greater detail in U.S. Pat. No. 2,625,959, issued Jan. 20, 1953, to R. G. Turner. The lay operating means can also be seen in greater detail in U.S. Pat. No. 3,127,912, issued Apr. 7, 1964, to M. C. Mosher.

In order to secure the weft loops after they have been inserted into their respective warp sheds, there is provided a selvage knitting needle **20** associated with each weft inserter. Each needle **20** has a hook **22** and a pivoted latch **24** and are mounted in a holder **26**. The holder **26** is reciprocated once for each weft insertion to move the knitting needles from a selvage loop engaging position as shown in FIG. **2** to a castoff position as shown in FIG. **1**. The selvage loop may consist of a separate catch cord, the weft loop itself, or a catch cord and weft loop together. These variations are shown more clearly in Shackleton, Jr., et al., supra, or U.S. Pat. No. 3,064,689 to Piazzolla et al. The means for reciprocating needle supporting holder **26** is shown in Shackleton, et al. supra, and U.S. Pat. No. 3,102,557 to R. W. Gustavson et al.

It is important that the latch for each needle be in the open position with respect to the hook when the needles are in the selvage loop engaging position. For this reason, a magnet **28** is mounted on a bracket **30** which is, in turn, mounted on holder **26**. Bracket **30** is preferably made of a nonmagnetic material such as brass or copper so that the magnetic field of the magnet will not be deflected with a resulting loss of effectiveness. The magnet **28** is further located between both needles **20** so that the planes in which the latches move intersect the magnet. The magnet is positioned close to the needles for maximum attraction and remains in the same position with respect to the needles, since it is mounted for reciprocation therewith. Magnet **28** is shown as a bar magnet, which is considered preferable to a horseshoe-type magnet for the purpose of this invention. The bar magnet has a larger magnetic field which extends around the magnet and is therefore easier to adjust. A bar magnet is also better suited for attracting both latches of needles **20** since the latches are located at adjacent opposite ends or poles of the magnet.

FIG. **2** shows the magnet **28** below the needles **20** because the needles are disposed so that the hook and latch of each needle extend at an angle of approximately 45° to the horizontal. The needles are disposed at the angle shown for knitting

loop engaging reasons only. The magnet is therefore mounted below the needles in order to intersect the plane in which the latches move. In this case, the latch of each needle moves in a plane which is 45° with respect to the horizontal and, as can be seen in FIG. 2, this plane intersects the magnet.

During operation of the loom the knitting needles move towards the rear of the loom during the back stroke of the lay, as shown in FIG. 2. At this time, a shed will be formed for each fabric and a weft inserter 16 will have inserted a loop of weft W into each shed. It is also at this time that the needles pick up their respective knitting loops. As seen in FIG. 2, the knitting loop in this case is also the weft loop which is shown being picked up by the hook of the knitting needle. If it is desired to knit the catch cord, the timing of the needle motion will be changed so that for each needle, the hook and latch extend through the weft loop to pick up a catch cord at a position rearward of the weft loop. The previous knitting loop is indicated at 32 and is located along the forward position of the shank 34 of the needle in FIG. 2.

During forward motion of the lay, the knitting needles move forwardly until each needle pulls the newly acquired knitting loop indicated at 36 through the previous knitting loop 32. As soon as loop 36 is pulled through loop 32, pressure on latch 24 is relieved and it will be attracted to the open position by the magnet 28. In FIG. 1, the loop 32 is shown slipping away or being cast off from the needle and the latch is shown in full lines in closed position the instant before it is pulled open by the magnet to the dotted line position. Even if the magnet were too weak to attract the latch from the closed position, loop 36 will force the latch open as it moves down the needle shank when the needles begin to move rearwardly for the next weft insertion. The latch then will be closer to the magnet and will be held in the open position even by a magnet which is too weak to attract it from the closed position.

Since the magnet remains adjacent to the latch of each knitting needle during the entire motion of the knitting needles, the latches will be maintained in their open position to enable the knitting needles to pick up their respective knitting loops during the rearward or knitting loop pickup position of the needles. A permanent magnet has been found to work satisfactorily and is desirable because of its low cost and ease of adjustment and installation, but an electromagnet would operate just as well.

Having thus described the invention, what is claimed is:

1. In a fabric loom having means for forming successive sheds of warp yarns; weft inserting means for depositing successive loops of weft yarn within said sheds; a knitting needle for knitting a selvage loop chain at one edge of said fabric, said needle having a selvage loop engaging hook and a latch movable between a closed position and an open position with respect to said hook; means to reciprocate said knitting needle between a selvage loop engaging position and a selvage loop castoff position; the improvement comprising a magnet mounted for reciprocation with said needle and adjacent to said knitting needle for holding said latch in said open position, whereby said latch will be in said open position as said knitting needle reaches said selvage loop engaging position.

2. In a fabric loom as described in claim 1 wherein two fabrics are woven side by side, there being a pair of latch needles as described for forming knitted chain selvages at adjacent edges of said fabrics and wherein said magnet is located between both of said needles for attracting and holding the respective latches of both of said needles.

3. In a fabric loom as described in claim 1 wherein said magnet is positioned so that it is intersected by the plane in which said latch moves between said open and closed positions.

4. In a fabric loom as described in claim 1 wherein said magnet is a bar magnet.

5. In a fabric loom as described in claim 1 wherein said magnet is mounted on a nonmagnetic material.