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SELVEDGE-FORMING DEVICE FOR SHUTTLELESS LOOMS

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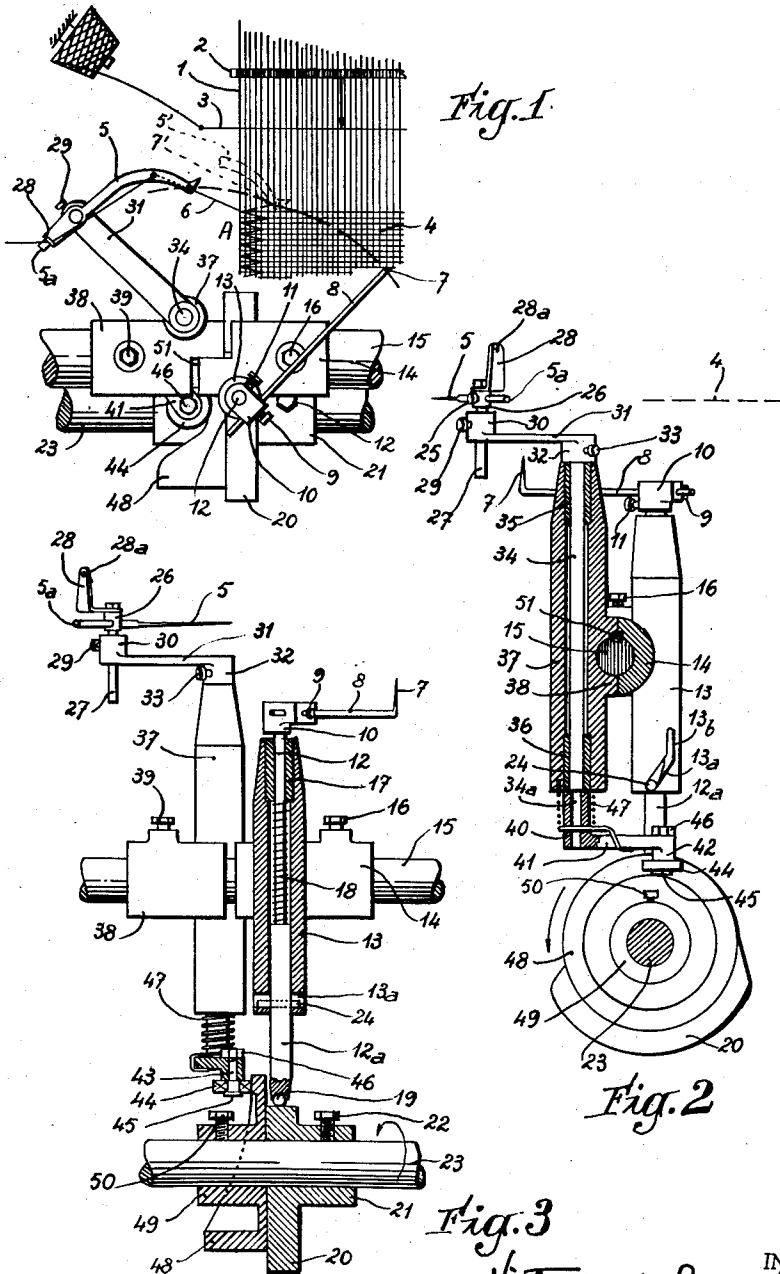


Fig. 1

Fig. 2

Fig. 3

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## SSELVEDGE-FORMING DEVICE FOR SHUTTLE- LESS LOOMS

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12 Claims. (Cl. 139—124)

This invention relates to a device for realizing selvages of the fabrics obtained by means of shuttleless looms.

It is known that such selvages may be produced by an auxiliary weft thread introduced under double form between the lateral warp threads at the open position of the shed, this double weft thread being beaten by the slay and clamped in the shed with the main weft thread itself. Such a process is disclosed in the French Patent 565,096, filed April 14, 1923. The device described in this patent for inserting the auxiliary weft thread into the shed is however cumbersome and cannot easily be mounted on most modern shuttleless weaving looms.

It has already been proposed to insert the auxiliary selvage-forming thread into the shed by means of an oscillating weft-inserting needle disposed on the side of the loom, and to retain the said thread in the shed by a weft-retaining pin vertically engaged through the lateral warp threads.

The present invention has for its object to provide a selvage-forming unit of the kind in question, of reduced dimensions, which may be easily disposed below the fabric in any shuttleless loom.

In accordance with the present invention in a selvage-forming device for shuttleless looms, of the kind comprising an oscillating weft-inserting needle which introduces an auxiliary weft thread into the shed under double form and a weft-retaining pin which retains the said auxiliary weft thread in the shed during the return movement of the oscillating needle. The retaining pin is disposed vertically at the end of a horizontal arm situated below the fabric, and is moved by the upper end of a vertical rod. The rod is adapted to move axially upwardly and downwardly, and to rotate through a given angle in one or the other direction at the end of its downward stroke and at the beginning of its upward stroke, in such a manner that at its lowermost position the said pin-carrying arm and the retaining pin are situated in front of the forward position of the reed which is carried by the slay of the loom.

The pin-carrying rod may be slidably disposed in a stationary sleeve, its lower end being directly actuated by a cam carried by a lower shaft of the loom. The angular displacement of the said rod may be ensured by a transverse finger engaging a stationary cam surface. The oscillating needle may be carried by another vertical rod angularly oscillated by a cam also carried by the said transverse shaft.

In the annexed drawings:

FIG. 1 is a plan view of a device according to this invention.

FIG. 2 is a side view thereof with parts in section.

FIG. 3 is a front view thereof, also with some parts in section.

In FIG. 1 the selvage-forming device is mounted on the left-hand side of the loom (for the operator standing in front of the taking-up roller thereof). The warp threads 1 from a beam (not illustrated) are appropriately raised and lowered by heddles or the like in order to form the shed, and they pass through the reed 2 carried by the slay. The weft thread 3 is inserted by an appropriate member, such as a transversely reciprocating needle. The fabric 4 is wound on a taking-up roller (not shown), its

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transverse tension being ensured by appropriate temples, not illustrated, disposed on each side of the loom in the zones such as A.

The selvage-forming device comprises an oscillating needle 5 adapted to insert an auxiliary weft thread 6 into the shed along a reduced portion of the width thereof starting from the left-hand side, and an auxiliary weft-retaining pin 7 which passes through the lateral warp threads for retaining the said auxiliary weft thread so as to form a loop during the return of the oscillating needle. The loop is thereafter beaten and caught in the shed as a double auxiliary weft together with the main weft thread 3. It is known that such a double weft thread automatically forms a selvage on the corresponding edge of the fabric.

Below the fabric 4 (indicated in dash lines in FIG. 2) is disposed a substantially horizontal arm 8 of relatively small diameter having one of its ends raised to the vertical and appropriately pointed to form the auxiliary weft-retaining pin 7, while its other end is secured by means of screw 9 in a block 10. Block 10 is in turn keyed by means of a screw 11 onto the upper end of a vertical rod 12 slidably disposed in a sleeve 13 (FIG. 3). Pin 7 and rod 12 are substantially parallel. Integral with sleeve 13 is a collar 14 adjustably mounted on a transverse supporting bar 15 by means of a screw 16. Sleeve 13 is bored to the diameter of the enlarged lower or second end portion 12a of rod 12, but it is provided at its upper end with an inner bushing 17 having substantially the same diameter as the upper portion of the said rod. The latter is urged downwardly by a spring 18 disposed thereon between bushing 17 and the lower portion 12a.

The lower end of the pin-carrying rod 12 rotatably carries a ball 19 which is pressed against the periphery of a cam 20 which is clamped by a screw 22 on a lower transverse shaft 23 adapted to rotate in synchronism with the operation of the loom. The lower enlarged portion 12a of rod 12 carries a transverse finger 24 both ends of which engage an elongated slot provided in the sleeve 13. The lower portion 13a of this slot is helical, i.e., it is at an angle with respect to the vertical axis of the sleeve, while the upper portion 13b of this slot is vertical. In operation cam 20 reciprocates vertically the pin-carrying rod 12. Starting from its uppermost position rod 12 moves downwardly without first rotating about its own axis while finger 24 is in the upper portion 13b of slot 13a—13b. But when finger 24 reaches the helical portion 13a of the slot, rod 12 rotates through a small angle during the remainder of its downward movement. Conversely at the beginning of the upward stroke of rod 12, the latter rotates through a small angle and then rises without rotating.

The auxiliary weft-inserting needle has a cylindrical horizontal tail 5a clamped by a screw 25 in a sleeve 26 which is provided with a cylindrical vertical tail 27. Sleeve 26 carries a lateral lug 28 having a raised end with a hole 28a for passage of the auxiliary weft thread 6. The tail 27 is clamped by a screw 29 in a cylindrical boss 30 provided at the outer end of a flat arm 31. The inner end of arm 31 has another cylindrical boss 32 clamped by a screw 33 on the upper or first end of a vertical rod 34 rotatably supported by bushings 35 and 36 in a vertical sleeve 37. The latter is integral with a horizontal collar 38 (FIG. 1) also adjustably mounted on the aforesaid transverse supporting bar 15 by a screw 39. The needle supporting rod 34 extends downwardly below the lower bushing 36 in the form of a second end portion 34a of reduced diameter on which is clamped a sleeve 40 integral with an arm 41. The latter has at its outer end a boss 42 in which is mounted a vertical gudgeon 43 (FIG. 3) which projects downwardly. On this gudgeon is disposed a ball bearing 44 the inner race of which is

which is clamped between the aforesaid boss 42 and the head 45 of gudgeon 43 under the action of a nut 46 screwed on the upper screw-threaded end of gudgeon 43. A torsional spring 47 is disposed on sleeve 40, the said spring acting on arm 41 so as to urge the roller bearing 44 against the side of a laterally-acting cam 48 the hub 49 of which is clamped by a screw 50 on the above-described shaft 23.

As illustrated in FIGS. 1 and 2 the transverse supporting bar 15, of circular cross-section, has on upper longitudinal groove in which is slidably mounted a key 51 engaged in corresponding grooves of collars 14 and 38 for retaining the latter against rotation during the adjusting operation. The facing ends of collars 14 and 38 are further so cut as to engage each other. It can therefore be seen that sleeves 13 and 37 along with corresponding rods 12 and 34 are mounted in substantially parallel relationship and at substantially right angles to rod 15.

The operation is as follows:

While the main weft thread is being inserted into the open shed, cam 48 acts on arm 41 and rotates the needle-carrying rod 34 whereby the auxiliary weft-inserting needle 5 is brought to its innermost position in the shed, as indicated at 5' in FIG. 1. The pin-carrying rod 12 is then raised by cam 20 and during the second portion of the upward stroke of the said rod the point of pin 7 passes vertically through the lateral warp threads between the branches of the V formed by the auxiliary selvedge-forming weft thread 6, as indicated at 7'. Needle 5 then returns toward its outermost position (illustrated in full lines in FIG. 1), beyond the adjacent edge of the fabric 4, but the auxiliary weft thread 6 is retained by the auxiliary weft-retaining pin in the form of a V-shaped loop. The pin carrying rod 12 then moves downwardly. During the second portion of its downward stroke, after pin 7 has been lowered below fabric 4, the said rod rotates through a small angle in a clockwise direction in FIG. 1, whereby pin 7 is brought to the position illustrated in full lines, the said position being situated at a distance in front of the last inserted weft thread of the fabric.

The slay then effects its stroke, the reed 2 beats up the main weft thread 3, which has just been inserted in the shed, together with the loop formed by the auxiliary weft thread 6. Owing to the advance position of the auxiliary weft-retaining pin, the reed remains at a noticeable distance therefrom and any contact between the pin and the reed is fully avoided. It will be observed that the auxiliary weft-inserting needle 5 is itself well beyond the side of the fabric and is not therefore liable to interfere with the operation of the reed.

At the next operating cycle the pin-carrying rod 12 will again be raised. During the first portion of its upward stroke it will rotate under the action of finger 24, whereby pin 7 will be returned to the proper position for passing vertically through the lateral warp threads without disturbing them during the second position of its upward stroke.

We claim:

1. A device to form a selvage on one edge of a fabric woven on a shuttleless loom, by means of an auxiliary thread inserted into the shed as a double weft on a small width along said edge, said device comprising a supporting bar, a collar adjustably clamped on said supporting bar, a sleeve carried by said collar substantially at a right angle to said supporting bar, a rod rotatably and slidably carried by said sleeve, said rod having a first and a second end protruding from said sleeve, an arm adjustably secured to the first end of said rod substantially at a right angle thereto, an auxiliary weft-retaining pin carried by said arm, said pin being substantially parallel to said rod and pointing in the reverse direction with respect to the second end thereof, means acting on the second end of said rod to reciprocate same axially in said

first sleeve so as to cause said pin to engage and to retain said auxiliary thread in the shed means to rotate said rod through a predetermined angle in one direction at the end of the stroke thereof for which the second end thereof is leading and in the reverse direction at the beginning of the stroke thereof for which the second end thereof is trailing, an oscillating auxiliary weft-inserting needle, adjustable means to rotatably support said needle, and means to oscillate said needle so as to cause same to insert said auxiliary thread into the shed to be retained by said pin.

2. In a device as claimed in claim 1, said means to reciprocate said rod comprising a rotatable cam and spring means acting on said rod to urge the second end thereof against the periphery of said cam.

3. In a device as claimed in claim 1, said means to rotate said rod comprising a transverse finger carried by said rod and stationary cam surfaces co-acting with said finger.

4. A device to form a selvage on one edge of a fabric woven on a shuttleless loom, by means of an auxiliary thread inserted into the shed as a double weft on a small width along said edge, said device comprising a supporting bar, a first collar adjustably clamped on said supporting bar, a first sleeve carried by said collar substantially at a right angle to said supporting bar, a first rod rotatably carried by said first sleeve, said rod having a first and a second end protruding from said first sleeve, an auxiliary weft-inserting needle adjustably secured to the first end of said first rod, means acting on the second end of said first rod to oscillate same so as to cause said needle to insert said auxiliary thread into the shed, a second collar also adjustably clamped on said supporting bar, a second sleeve carried by said second collar, substantially at a right angle thereto, a second rod slidably and rotatably carried by said second sleeve, said second rod having a first end and a second end protruding from said second sleeve, an arm adjustably secured to the first end of said second rod substantially at a right angle thereto, an auxiliary weft-retaining pin carried by said arm, said pin being substantially parallel to said second rod and pointing in the reverse direction with respect to the second end thereof, means acting on the second end of said second rod to reciprocate same axially so as to cause said pin to engage and to retain said auxiliary thread in the shed, and means to rotate said second rod through a predetermined angle in one direction at the end of the stroke thereof for which the second end thereof is leading and in the reverse direction at the beginning of the stroke thereof for which the second end thereof is trailing.

5. In a device as claimed in claim 4, said means to oscillate said first rod comprising an actuating arm at the second end of said first rod, a follower at the end of said actuating arm, a first rotatable cam to co-operate with said follower, and spring means to urge said follower against the side of said first rotatable cam.

6. In a device as claimed in claim 4, said means to reciprocate said second rod comprising a second rotatable cam and spring means acting on said second rod to urge the second end thereof against the periphery of said second rotatable cam.

7. In a device as claimed in claim 4, said means to rotate through a predetermined angle said second rod in one and the other direction comprising a transverse finger carried by said second rod and stationary cam surfaces co-acting with said finger.

8. In a device as claimed in claim 4, said supporting bar being of circular cross-section and having a longitudinal groove, said first collar and said second collar having each a corresponding longitudinal groove, and said device comprising in the groove of each of said first and second collars a key slidably engaged in the groove of said supporting bar, the grooves of said first and second collars being so disposed that said keys maintain

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said first and second sleeves substantially parallel to each other and substantially perpendicular to the shed of said loom.

9. A selvage forming device for a shuttleless loom having warp threads forming successive sheds with two lateral edges, said sheds receiving weft threads, and a reed to forwardly beat each of said weft threads in the corresponding shed to form a fabric, said device comprising an auxiliary weft-inserting needle to insert an auxiliary weft-thread into each of said sheds, means to oscillate said needle in unison with operation of said loom to cause said needle to enter each of said sheds from one side thereof to form therein, with said auxiliary weft thread, a substantially U-shaped loop, an auxiliary weft-retaining pin passing through the warp threads of said shed to retain said U-shaped loop during return movement of said auxiliary weft-inserting needle, an arm having a first and a second end, the first end of said arm carrying said auxiliary weft-retaining pin, a rod substantially perpendicular to each of said sheds and to which said second end of said arm is secured, means to reciprocate said rod axially to cause said auxiliary weft-retaining pin to enter each of said sheds to retain said U-shaped loop and to thereafter withdraw therefrom after the return movement of said auxiliary weft-inserting needle, and means to reciprocate said rod angularly about its own axis to bring said auxiliary weft-retaining pin at a distance in front of the foremost position of said reed during the beating movement thereof after said pin has been withdrawn from each of said sheds and to thereafter return said pin before it re-enters the next one of said sheds.

10. In a device as claimed in claim 9, said rod having a first and a second end, said second end of said arm being secured to said first end of said rod, and said means to reciprocate said rod axially comprising a rotatable cam acting on the second end of said rod, spring means

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to directly urge said rod against said cam, and a shaft to rotate said cam in unison with operation of said loom.

11. In a device as claimed in claim 9, said means to reciprocate said rod angularly comprising a transverse finger carried by said rod and stationary cam surfaces co-acting with said transverse finger to oscillate said rod in one direction at the end of the axial stroke of said rod for which said pin withdraws from each of said sheds and in the other direction at the beginning of the axial stroke of said rod for which said pin re-enters the next one of said sheds.

12. In a device as claimed in claim 9, said rod having a first and a second end, said second end of said arm being secured to said first end of said rod, said means to reciprocate said rod axially comprising a rotatable cam acting on the second end of said rod, spring means to directly urge said rod against said cam, and a shaft to rotate said cam in unison with operation of said loom, and said means to reciprocate said rod angularly about its own axis comprising a transverse finger carried by said rod and stationary cam surfaces co-acting with said transverse finger to oscillate said rod in one direction at the end of the axial stroke of said rod for which said pin withdraws from each of said sheds and in the other direction at the beginning of the axial stroke of said rod for which said pin re-enters the next one of said sheds.

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