WEFT TENSIONING AND INSERTING DEVICE FOR GRIPPER SHUTTLE LOOMS

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Filed Aug. 18, 1960, Ser. No. 59,430
10 Claims. (Cl. 139—136)

This invention relates to a loom in which the weft yarn is withdrawn from stationary pins for insertion into the shed.

In a known type of loom of this kind sufficient weft yarn for two picks is withdrawn from pins located on both sides of the loom. The ends of the picks are gripped in alternation by a nipper shuttle which consecutively traverses the shed in both directions and draws the yarn into the shed alternately from the right and the left of the loom to the effect that picks consecutively withdrawn from each side of the loom form loops around the edge of the fabric and produce a firm selvage. One of the advantages of this kind is that the picks do not remain under tension when they are released by the nipper. Consequently the picks tend to draw back into the shed and to cause dislocations and irregularities in the weave, for instance in the form of eyes in the weft. The absence of tension in the picks may also cause the weft stop motion to operate and the loom to be stopped without cause.

In another known type of this kind the weft yarn for forming either two or only one pick is likewise withdrawn for pins on both sides of the loom. In this loom the ends of the picks are also gripped by a nipper shuttle and drawn into the shed alternately from the right and the left, so that the picks are derived from the right and the left hand side of the loom.

In order to maintain the picks under tension when they are released by the shuttle, suction openings are located on the face of the loom on both sides of the fabric at a given distance therefrom, the ends of the picks being drawn into the openings by the suction effect. For retaining the ends of the picks, gripping slides are provided and cutters later cut off the ends of the picks. This loom likewise suffers from several drawbacks. The ends of the picks are not exposed to the suction effect until the nipper shuttle has moved past the openings. It is then already too late for a decisive effect on the picks to take place because by then the shed has already closed. Furthermore, in this loom, there is considerable waste of material and the cutting off of the ends of the picks which project from the fabric causes additional work.

Finally, the provision of the suction orifices and of gripping slides for cooperation therewith as well as of the cutters cause such a loom to be of relatively complex construction.

The loom contemplated by the present invention is likewise one in which the necessary weft yarn for two picks is withdrawn from pins on both sides of the loom, the picks being inserted into the shed by a shuttle containing no pins alternately from the right and the left, and in which the picks are subjected to suction for keeping them under tension as they slip out of the shuttle. In the contemplated loom it is the object of the present invention to overcome the disadvantages inherent in known types of loom, more particularly to ensure that the picks will pull straight in a desirable manner when they are released by the shuttle. To this end the invention proposes to equip the loom at both edges of the loomed fabric, for the purpose of subjecting the picks to a suction effect, with slidably displaceable suction pipes which enter the shed as the shuttle approaches, intercept the yarn by their suction as it slips from the shuttle and then withdraw from the shed whilst retaining the yarn.

In a preferred form of the present invention the front of the shed below the race is fitted with a horizontal rail upon which the suction pipes are mounted on slidable sleeves, a helical spring interposed on the rail between the said sleeves of the suction pipes urging the pipes apart in opposite directions, eccentrics being provided for controlling the motions of the suction pipes through draw means attached to the slidably affixed to the slidable sleeves.

According to the invention the suction effect generated by the suction pipes for holding and straightening the picks is preferably of short duration. With reference to the particular form of construction of the suction pipes, the invention envisions various embodiments which can be used according to their suitability for different kinds of weft material. In order to adapt the suction pipes to weft yarns of different kinds they may be of multipart construction and detachably affixed to the slidable sleeves.

Since in the novel loom the suction pipes enter the shed when the shuttle approaches for intercepting the picks before the shed closes, they ensure that the picks are correctly entrained and pulled straight. This is a matter of particular importance if the loomed materials are smooth, elastic, or of a kind which easily accepts an electrostatic charge, since in such materials the picks are particularly liable to pull back into the shed and to give rise to irregularities in the weft. The fact that in the proposed loom the suction pipes enter the shed when the shuttle approaches and intercept the yarn as it slips from the shuttle has the further advantage that the ends of the picks need not be so long as to project from the edge of the fabric and can be just long enough to end at the selvage. This provides an economy in material and also saves the time otherwise expended in cutting off the loose ends of the picks by a special subsequent operation. Moreover, the proposed loom does not require the provision of special gripping slides and of cutting devices cooperating with the suction pipes for the purpose of retaining and cutting off the ends of the picks, such devices introducing complexities into the construction of the loom besides preventing the employment of temples.

The relevant parts of the loom according to the invention are illustratively and partly schematically shown in the accompanying drawings which also show the manner in which the loom operates and the disposition of the fabric which can be produced. In the drawings:

FIG. 1 is a plan view of a fabric produced on the loom,
FIGS. 2 to 7 schematically illustrate the manner in which the loom functions,
FIG. 8 is an illustration of the shuttle used in the loom, with a pick and a suction pipe seen from above,
FIG. 9 is the loom of the pipe with suction pipes mounted thereon as well as the means for supporting and actuating the suction pipes, seen in front elevation,
FIGS. 10 to 12 are three alternative embodiments of suction pipes seen from the front,
FIG. 13 is another embodiment of the suction pipe and of the means of mounting the same, seen from the front with respect to the loom.

In the diagram of the fabric shown in FIG. 1 the warp ends are indicated by the picks inserted from the left hand side of the loom by b1 and those inserted from the right hand side of the loom by b2.

On both sides of the loom there are provided in conventional manner yarn gripper means, with a yarn guide 20, as well as two grippers 21 and 22 which alternately grip the weft yarn b, i.e. the picks b1 and b2. Further-
more, there is provided, on each side of the loom, likewise in conventional manner, a pick length measuring device with revolving projections 23 and 24 which entrain the weft yarn b at the grippers and withdraw the same, as well as a shear 25 for severing the yarn lengths for forming the picks b1 and b2 from the supply of weft yarn b.

FIGS. 2 to 7 illustrate the manner in which the loom functions by showing the operations which are consecutively performed on the right hand side of the loom. As shown in FIG. 2 the end of the weft yarn b is gripped in an outer gripper 21 and projected by a yarn guide 32 to an open inner gripper 22. As shown in FIG. 3 the weft yarn extending between the two grippers 21 and 22 is now entrained by a projection 23 of the pick length measuring means and a length of yarn is withdrawn which corresponds with the length of the first pick b1' by the yarn during said withdrawal running through the open inner gripper 22. When the length of the first pick b1' has thus been measured, as shown in FIG. 4, the yarn is retained by the closure of the inner gripper 22 and the outer gripper 21 opens for releasing the free end of the pick. The yarn guide 32 now swings the yarn b from the inner gripper 22 back to the outer gripper 21 which is opened. As shown in FIG. 5, the first pick b1' is then inserted into the shed by the shuttle 26. As shown in FIG. 6, the yarn b which now extends between the two grippers 21, 22 is entrained by the second projection 24 of the pick length measuring means and the length required for the second pick b2' from the right hand side of the loom is withdrawn, the yarn b running through the open outer gripper 21. As soon as the yarn b has again been gripped by the outer gripper 21 the yarn b2 is cut off at the rear end of the second pick b2' from the right hand side of the loom by shear 25 and the severed portion of yarn b is finally released by the inner gripper 22 in the manner shown in FIG. 7. The portion of yarn forming the second pick b2' from the right hand side of the loom is then inserted by shuttle 26.

The left yarn b unwinds from the cross wound pins on both sides of the loom and is conducted by suitable guide means to the yarn gripping and pick length measuring devices through a gentle yarn brake 27. In view of the distance between the yarn grippers and the selvages of the fabric, different lengths of yarn b are withdrawn for forming the two picks b1 and b2, the said picks b1 and b2 extending from the first and second pick which are inserted from the same side of the loom. The second pick is shorter than the first pick by twice the distance between the yarn gripping means and the selvage.

The shuttle 26 illustrated in FIG. 8 is a flat member with a cavity 28 opening along a portion of its length in the upward direction. The forward side wall likewise has a recess 29 which opens in the upward direction. Finally, the shuttle is provided with a yarn entraining member 30 of wing-like shape, each wing pointing in one of the longitudinal directions of the shuttle and being located inside the cavity 28 in the region of the recess 29.

Fitted to the front face of the sley 31 is a guide rail 32, as shown in FIG. 9. This rail carries slidable sleeves 33 upon which suction pipes 34 are mounted. A helical spring 35 surrounding rail 32 is interposed between the slidable sleeves 33 of the suction pipes 34 in such manner as to engage the two pipes 34 and a second pick when out of the warp shed, and means to move each suction pipe into the shed to meet an approaching shuttle and withdraw the suction pipe in unison with the shuttle, whereby the pick ends will be drawn to the suction pipes as they slip from the shuttle and be held under tension as the suction pipes withdraw from the shed.

The suction opening of suction pipe 34a in FIG. 11 is covered with a fine mesh 39, such as metal gauze. This offers a surface upon which the yarn can rest whilst it is exposed to the suction effect. A similar effect is produced by the third suction pipe 34c illustrated in FIG. 12. The suction opening of this pipe is provided with a central orifice 40 with a central orifice 41 at its leading end and two symmetrically disposed orifices 42 towards the rear end. The two last described suction pipes 34b and 34c are especially suitable for picks of medium and fine gauge.

The suction pipe 34d, shown in FIG. 13, tapers towards the suction opening, which is provided with a central orifice 43 extends approximately parallel with shuttle 26. On the side of the taping portion 43 facing the shuttle 26 are a number of suction orifices 44 which form a linear row. Owing to the large number of small openings 44 this suction pipe 34d has a particularly intense suction effect on the ends of the picks. Moreover, the wall of the taping portion 43 offers a surface upon which the end of the pick can rest whilst it is held by the suction.

Although not specially shown in the drawing, the suction pipes 34 are of multipart construction and the portion provided with the suction opening or openings is detachably affixed to the supporting slidable sleeve 33. To this end, the sleeves 33 are fitted with clamping jaws 45 and screw means 46 for locating the end portion of the suction pipes 34 on the sleeves 33.

When the suction pipes 34 enter the shed during the approach of the shuttle, the end of the suction pipe is inserted in the shed in relation to shuttle 26 which is illustratively and diagrammatically shown in FIG. 8. They remain in this position by moving out of the shed together with the shuttle 26. The end of the pick b2 which slips from the shuttle 26 is held captive by the suction of pipe 34 and is therefore extended until it is straight.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A loom of the type in which lengths of weft yarn for two picks are withdrawn from pins on both sides of the loom, the ends of the picks being inserted into the shed alternately from the right and the left of the loom by means of a pinless shuttle riding upon a sley, and the ends of the picks upon being released by the shuttle are subject to suction to hold the picks under tension, the improvement which comprises, suction pipes slidably mounted at each side of the loom for movement into and out of the warp shed, and means to move each suction pipe into the shed to meet an approaching shuttle and withdraw the suction pipe in unison with the shuttle, whereby the pick ends will be drawn to the suction pipes as they slip from the shuttle and be held under tension as the suction pipes withdraw from the shed.

2. A loom as claimed in claim 1 wherein, the suction pipes have suction ends which are bevelled to provide suction orifices, and the suction pipes are mounted with their suction orifices parallel to the path of movement of the shuttle along the sley.

3. A loom as claimed in claim 2 wherein, the suction pipe is notched from the suction orifice to provide a yarn end entry notch extending from the orifice.

4. A loom as claimed in claim 2 wherein, the bevelled suction orifices are covered with a mesh-like material.

5. A loom as claimed in claim 2 wherein, the suction orifices are closed by cover plates having central openings at their leading ends and two openings symmetrically disposed on opposite sides of the suction pipe axis at the rear ends of the cover plates.

6. A loom as claimed in claim 1 wherein, the suction pipes have suction ends and taper towards their suction ends, the suction pipes being mounted with their tapering ends generally parallel to the path of movement of the shuttle along the sley, and the tapering ends each having a wall adjacent the shuttle path with a row of adjacent suction orifices.
A loom as claimed in claim 1 wherein, the suction pipes have detachable suction end portions.

A loom as claimed in claim 1 wherein, the suction hold of the suction pipes upon the picks is of short duration only.

In a loom of the type in which lengths of weft yarn for two picks are withdrawn from pirns on both sides of the loom, the ends of the picks being inserted into the shed alternately from the right and the left of the loom by means of a pinless shuttle riding upon a sley, and the ends of the picks being released by the shuttle are subject to suction to hold the picks under tension, the improvement which comprises, a horizontal guide rail mounted upon the sley, a sleeve slidably mounted upon the rail adjacent each end of the sley, suction pipes carried by the sleeves, a spring surrounding the guide rail between the sleeves urging the sleeves apart, and an eccentric in operable relation to each sleeve to move the sleeve along the guide rail to move the suction pipe carried by the sleeve into the warp shed to meet an approaching shuttle and permit withdrawal of the suction pipe from the shed under the influence of the yieldable means, whereby the pick ends will be drawn to the suction pipes as they slip from the shuttle and be held under tension as the suction pipes withdraw from the shed.

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