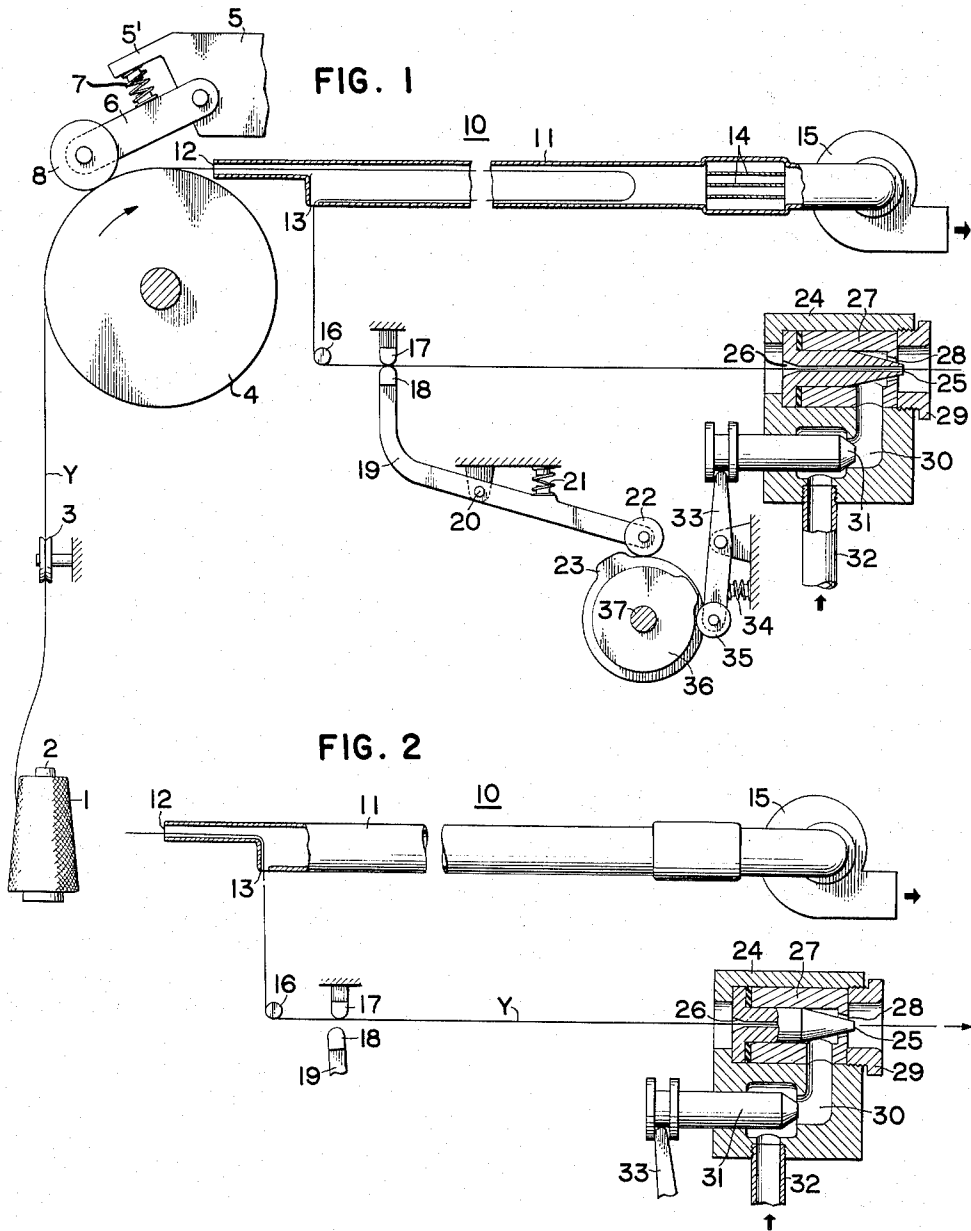


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YASUSHI KOBAYASHI
DEVICE FOR CONTROLLING LENGTH OF WEFT YARN
ON FLUID JET SHUTTLELESS LOOM
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Yasushi Kobayashi,
Inventor
By Wenduath Lind and
Ponack, Attorneys

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DEVICE FOR CONTROLLING LENGTH OF WEFT YARN ON FLUID JET SHUTTLELESS LOOM

Yasushi Kobayashi, Tokyo, Japan, assignor to Prince Jidosha Kogyo Kabushiki-Kaisha, Tokyo, Japan, a corporation of Japan

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This invention relates to a fluid jet shuttleless loom and more particularly to a device incorporated in such a loom for controlling a length of weft yarn to be projected.

In the fluid jet type of shuttleless loom, it is, as a matter of course, necessary to adjust a length of weft yarn which is to be projected at each projection, to a predetermined magnitude by temporarily detaining a portion of the weft yarn after it has been unwound from its bobbin to serve as a supply such that it has a predetermined length immediately before its projection and then projecting the predetermined length of the weft yarn at the proper time. Upon projecting the portion of the weft yarn thus detained, it must be able to be readily extended without becoming entangled and with a minimum of resistance, whereby the weft portion can be advanced in a straight line by the action of a fluid jet.

It is, therefore, an object of the invention to provide, in a fluid jet shuttleless loom, an improved device for controlling a length of weft yarn to be projected wherein the above-mentioned requirements are met.

The aforesaid object is accomplished by an apparatus characterized in that between a unit for continuously drawing out a weft yarn and a unit for intermittently grasping the weft yarn in a position just preceding a fluid operated unit for projecting the weft yarn, a portion of the weft yarn is detained in a loop by the action of a unidirectional stream of fluid.

The invention will become more readily apparent from the following detailed description of an illustrated embodiment thereof, the description being taken in conjunction with the accompanying drawings in which:

FIG. 1 is a view, partly in longitudinal section and partly in elevation of a device constructed in accordance with the teachings of the invention and illustrating a condition in which a length of weft yarn is detained immediately before its projection; and

FIG. 2 is a view similar to FIG. 1 but illustrating certain essential components of the device in positions during the time the length of weft yarn is being projected.

Referring now to the drawings and more particularly to FIG. 1, there is illustrated a device for controlling a length of a weft yarn in accordance with the teachings of the invention. A weft yarn Y is progressively unwound from a bobbin 1 rotatably mounted on a support shaft 2 and the yarn is passed through tension controlling means, here shown as a tension controlling roller 3, to a drawing-out roller 4 adapted to be rotated at a predetermined fixed speed. The main body of a loom 5 (a portion of which is illustrated in FIG. 1) includes an arm 6 pivotably secured thereto for vertical rocking movement under the action of a spring 7 disposed between the said arm and a lug 5' on the loom body 5. At its free end the arm 6 has a rotatable pressing roller 8 adapted to resiliently engage the drawing-out roller 4 so that the weft yarn will be passed therebetween. In this way, the weft yarn Y can be drawn out at a predetermined speed for subsequent handling.

According to the invention, a length of the weft yarn Y is detained within a tubular detaining chamber generally designated by the reference numeral 10. The retaining chamber 10 comprises a hollow cylindrical member 11

including, at one end thereof near to the roller 4 a tubular projection 12 parallel to and offset from the axis of the cylindrical member 11 and serving as an entrance through which the weft yarn leaving the roller 4 is introduced into the chamber 10. Adjacent the tubular projection 12 and substantially on the opposite side of the axis of the chamber 10 from the tubular projection 12 is a downwardly opening outlet 13 serving as an exit through which the detained yarn is delivered to a yarn projecting unit as will be described hereinafter. Adjacent the other end of the chamber 10 and within the same a plurality of stream equalizing plates 14 are disposed parallel to each other and to the longitudinal axis of the chamber. As shown in the drawings, the chamber 10 is connected at said other end to a suction device 15 which, in turn cooperates with the plates 14 to form a stream of air flowing substantially uniformly through the chamber 10 toward the other end thereof. It is to be noted that the detaining chamber 10 is disposed with respect to the drawing-out roller 4 such that the opening into tubular projection 12 can receive the weft yarn drawn out by the roller 4 directly.

A guide roller 16 is disposed directly under the exit opening 13 on the detaining chamber 10. Also disposed adjacent and to the right of the roller 16 as viewed in FIGS. 1 and 2 is means for catching or grasping the weft yarn and comprising a stationary jaw 17 and a movable jaw 18 rigidly connected at one end of an angled lever 19. The lever is pivotably supported at its fulcrum 20 and normally tends to force the jaw 18 toward the jaw 17 under the action of the spring 21. The lever 19 has on the other end a cam follower 22 adapted to be controlled by a cam 23 as will be described hereinafter. The lower end of the stationary jaw 17 is preferably positioned at the substantially same level as the lower side of the roller 16 for a purpose which will be apparent later.

The present device further includes a fluid operated unit for projecting the weft yarn. As shown, this unit comprises a housing 24, a nozzle member including a yarn threading bore 26 extending axially of the same, a coned end portion serving as a projecting nozzle 25, and a sleeve 27 enclosing the nozzle member to maintain the same in place. As shown, the bore 26 is aligned with both the lower end of the jaw 17 and the lower side of the roller 16. The sleeve 27 has at its free end a circular opening adapted to form with the coned cam end portion of the nozzle member an annular nozzle 28 for projecting water under pressure, and the sleeve is maintained in place by a retaining ring 29. The spouting nozzle 28 communicates with a water duct 30 formed in the housing 24 and connected through a normally closed needle valve 31 to a pipe 32 for supplying water under pressure. The needle valve 31 has a valve stem operatively connected to a lever 33 pivoted on a fulcrum 34 and normally biased toward a position in which the valve is closed as shown in FIG. 1, by the action of a spring 34. The valve stem also has at the other end a cam follower 35 adapted to engage a cam 36 mounted on a shaft 37 on which the cam 23, as previously described, is also mounted. The cams 23 and 36 are mounted on the common shaft 37 such that, during operation of the apparatus the needle valve 31 is opened (see FIG. 2) just before the jaw 18 disengages from the jaw 17.

The device thus far described is operated as follows: The weft yarn Y unwound from the bobbin 1 is fed through the tension controlling roller 3 and to the rollers 4 and 8. The yarn leaving the roller 4 is threaded through the entrance opening 12 into the detaining chamber 10 and then delivered through the exit opening 13 from the same. Then the yarn is passed around the guide roller 16 to the grasping means 17, 18 where it is firmly grasped between the engaged jaws 17 and 18. Thereafter, the

yarn is threaded through the bore 26 and the nozzle 25 in the projecting unit.

As previously described, the uniform stream of air flowing through the chamber 10 unidirectionally toward the suction device 15 is maintained by both the suction device and the equalizing plates 14 so that a portion of the yarn is pulled toward the plates 14 and is maintained in a loop in a tensioned state as shown in FIG. 1. Also the portion of the yarn located between the exit opening 13 and the engaged jaws 17, 18 is maintained in a tensioned state. In addition, the portion of the yarn disposed between the jaws and the exit from the projection nozzle 25 is brought into the tensioned state. Under these circumstances, the cam 36 is operated to open the needle valve 31 permitting water under pressure to be ejected through the annular nozzle 28. This jet of water exerts on the portion of the yarn extending from the nozzle 25 a force tending to pull the same in to the right as viewed in FIG. 1. At that moment, the cam 23 is operated to disengage the movable jaw 18 from the stationary jaw 17 to free the yarn. Thus the yarn is advanced in a straight line toward the shed of warp yarns (not shown), and it is extended and assumes the state illustrated in FIG. 2. Thereafter, the jaws 18 will engage the jaw 17 to hold the yarn therebetween. Again the unidirectional stream of air flowing through the chamber 10 acts on the portion of the yarn moving into the chamber to again form the tensioned loop. Thereafter the cycle of operation as above described is repeated.

It is to be noted that the speed of the roller 4, the dimension of the chamber 10 in which the yarn is held in the tensioned loop, and the intensity of the air stream should be correlated to one another such that the yarn is never loosely positioned within the chamber 10. Also the yarn should preferably be released at an instant the yarn reaches the looped and tensioned state having the permissible maximum length.

From the foregoing it will be appreciated that, in contrast to the prior art practice wherein means for detaining a yarn to be fed utilizes a winding or hooking operation unsuitable for pulling out a yarn from a projection unit while stretching the same in a straight line, the invention provides means for detaining a loop of yarn in a looped condition by floating the same in a stream of air. As a result, a predetermined length of yarn suitable for a fabric to be produced can be preliminarily detained and then smoothly drawn out of the chamber 10 and projected as a weft yarn without becoming entangled and with substantially negligible resistance. The length of yarn can be established by setting a correct period of time for which the yarn is detained, the time at which the fluid conduit in the projection unit is opened, the time at which the grasping means is released and the like for each operating period.

What I claim is:

1. In a fluid jet shuttleless loom having means for drawing-out a yarn at a predetermined speed and in a drawing out direction from a yarn supply, and means for projecting the yarn by the action of a fluid jet, a device for holding a length of the yarn to be projected including means adapted to be positioned immediately preceding said projecting means for grasping the drawn-out yarn,

an airstream confining means immediately preceding said grasping means and extending in said drawing out direction and having one end adjacent the drawing out means, means for generating a stream of air in said drawing out direction and attached to the other end of said airstream confining means, said airstream confining means detaining the yarn in a folded state by floating the same in said stream of air while the yarn is grasped by said grasping means, and means coupled to said grasping means for releasing said grasping means at predetermined times to permit the detained yarn to advance through said projecting means, while it stretches, by the action of said fluid jet.

2. In a fluid jet shuttleless loom having means for drawing out a yarn at a predetermined speed and in a drawing out direction from a yarn supply, and means for projecting the yarn by the action of a fluid jet, a device for holding a length of the yarn to be projected including a pair of jaws adapted to be positioned immediately preceding said projecting means for normally grasping the drawn-out yarn therebetween, an elongated yarn detaining chamber adapted to be disposed adjacent said drawing-out means and extending in said drawing-out direction, said chamber being positioned immediately preceding said pair of jaws, suction means operatively connected to said detaining chamber to generate a stream of air in a predetermined direction within the chamber, said stream of air serving to float the yarn introduced into said chamber to thereby detain the same in the folded state, and means coupled to said jaws for instantaneously releasing said pair of jaws at predetermined times to permit the detained yarn to advance through said projecting means, while it stretches, by the action of said fluid jet.

3. A device as claimed in claim 2 in which said chamber has a tubular projection extending therefrom toward the drawing-out means, said tubular projection being parallel to and offset from the axis of the elongated detaining chamber, and said detaining chamber having a yarn outlet therein at the end thereof from which said tubular projection projects and substantially on the opposite side of the axis of the chamber from the tubular projection.

4. A device as claimed in claim 2 in which said detaining chamber has a plurality of parallel plates in the end thereof adjacent said suction means and parallel to the axis of the chamber for making the flow of air through said chamber parallel to the axis of the chamber.

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DONALD W. PARKER, *Primary Examiner.*

RUSSELL C. MADER, *Examiner.*