

SPECIFICATION

Needle loom

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This invention relates generally to needle looms, and more particularly to apparatus for supplying a weft thread to a weft inserter in a needle loom, and to a
10 needle loom adapted to carry out such method.

In conventional needle looms, it has been a common practice to control the degrees of tension of a weft thread when supplying the latter to a weft inserter simply with the use of a tension control
15 device of known construction. The tension control device includes a pair of opposed resilient members each having an eye in its free end for guiding the weft thread therethrough. On its path of travel to the weft inserter, the weft thread extends through the
20 two eyes of the resilient members and then an eye of the weft inserter. As the weft inserter reciprocates to intermittently draw out the weft thread for insertion through successive warp sheds, the weft thread becomes alternately taut and loose. This tension
25 change causes the opposed resilient members to bend and restore so as to move their eyes toward and away from each other depending on the amount of tension of the weft thread. Thus, the weft thread tension is automatically controlled to remain
30 constant during weaving. However, because of its limited mechanical and functional properties, this tension control device does not work reliably when used in modern high-speed needle looms.

According to the invention there is provided an
35 apparatus for supplying a weft thread to a weft inserter in a needle loom, which is reciprocally movable across successive warp sheds to insert the weft thread therein, said apparatus comprising means for feeding the weft thread at variable speed
40 according to the amount of the weft thread drawn out by the weft inserter, and spring means for correcting the tension of the weft thread being drawn, said feeding means comprising a pair of rollers for feeding therebetween the weft thread
45 from a cheese to the weft inserter, one of said pair of rollers being driven by a gear which is in mesh with an intermediate gear driven at variable speed by a drive gear which rotates about the axis of an eccentric shaft, said intermediate gear being carried
50 by a pair of first and second links so as to roll on both said first mentioned gear and said drive gear in continual mesh therewith as all said gears rotate.

The invention will now be described by way of example with reference to the accompanying
55 drawing, wherein:-

Figure 1 is a schematic plan view, with parts broken away, of a needle loom which includes apparatus according to the invention; and

Figure 2 is an enlarged plan view of a

60 speed-changing mechanism in the loom of *Figure 1*.

With reference to *Figure 1*, there is fragmentarily and schematically shown a needle loom, generally indicated by the numeral 10, for weaving a fabric 11 of a weft thread 12 and warp threads 13.

65 The needle loom 10 essentially comprises a

plurality of harnesses 14 for forming sheds by raising and lowering the warp threads 13 selectively, a weft inserter 15 for inserting the weft thread 12 through the warp sheds, a latch needle 16

70 reciprocable in warp direction alongside one longitudinal edge of the fabric 11 for catching and knitting the weft thread 12 in the warp shed so as to form a selvedge along said one longitudinal fabric edge, and a reed 18 for beating the weft thread 12 in the warp shed against the fell of the fabric 11.

Alongside the warp threads 13, the weft thread 12 extends from a cheese (not shown) of known construction to the fabric 11 via a pair of feed rollers 19, 20, a tension control device 21, and an eye 22 of
80 the weft inserter 15.

The tension control device 21 includes a pair of opposed resilient members 23, 24 each generally of a dogleg-shape, a pair of inlet and outlet guides 25, 26, and an intermediate guide 27. Each resilient
85 member 23(24) is fixed at its spiral end to a stationary pin 28(29), and has an eye 30(31) in its free end. In the tension control device 21, the weft thread 12 travels via the inlet guide 25, the intermediate guide 27, the eyes 30, 31 and the outlet
90 guide 26.

As the weft inserter 15 reciprocates into and out of the successive warp sheds to insert the weft thread 12 therethrough, the weft thread 12 is intermittently drawn out, causing the weft thread 12 to become
95 alternately taut and loose. Instantaneously, this tension change in turn causes the opposed resilient members 23, 24 to bend and restore such that their eyes 30, 31 move toward and away from each other depending on the amount of resultant tension of the
100 weft thread 12.

Thus, the weft thread tension is controlled to remain constant by spring action. Designated at 17 is the orbit which the eye 22 of the weft inserter 15 follows as the latter reciprocates.

105 In order to minimize the amount of the tension change to be corrected by the tension control device 21, the weft thread 12 is fed by the feed rollers 19, 20 at variable speed according to the amount of the weft thread 12 drawn out by weft inserter 15, the
110 feed rollers 19, 20 being located upstream of the tension control device 21.

Proper speed changes of the feed rollers 19, 20 may be obtained by a speed-changing mechanism such as shown in *Figure 1*, generally designated at
115 32. As best shown in *Figure 2*, the mechanism 32 essentially comprises a gear train including a pair of spaced first and second sun gears 33, 34 and a planet gear 35 interposed between the two sun gears 33, 34 and meshing therewith, the first sun gear 33 being
120 eccentrically mounted on a driving shaft 36. The planet gear 35 is carried by a pair of first and second links, 37, 38 so as to roll on both first and second sun gears 33, 34 in continual mesh therewith as these gears 33, 34, 35 rotate.

125 Assuming that the first sun gear 33 makes one complete rotation counterclockwise (*Figure 2*) with constant angular speed, namely, with variable peripheral speed, the planet gear 35 rotates clockwise at variable speed and thus the second sun gear 34 rotates counterclockwise at variable speed.
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An endless belt 39 is wound around a pair of pulleys 40, 41 concentrically fixed with respect to the second sun gear 34 and said one of the feed rollers 19, respectively, for rotating the feed rollers 19, 20 at variable speed-alternately at high and low speeds. The feed roller 20 is a pinch roller. This speed change of the feed rollers 19, 20 is timed with the weft inserter motion; that is, these feed rollers 19, 20 are rotated at high speed while the weft inserter 15 is moving into the warp shed and at low speed while the weft inserter 15 is retracting from the warp shed.

CLAIMS

1. An apparatus for supplying a weft thread to a weft inserter in a needle loom, which is reciprocally movable across successive warp sheds to insert the weft thread therein, said apparatus comprising means for feeding the weft thread at variable speed according to the amount of the weft thread drawn out by the weft inserter, and spring means for correcting the tension of the weft thread being drawn, said feeding means comprising a pair of rollers for feeding therebetween the weft thread from a cheese to the weft inserter, one of said pair of rollers being driven by a gear which is in mesh with an intermediate gear driven at variable speed by a drive gear which rotates about the axis of an eccentric shaft, said intermediate gear being carried by a pair of first and second links so as to roll on both said first mentioned gear and said drive gear in continual mesh therewith as all said gears rotate.
2. An apparatus according to claim 1, wherein said spring means comprises a pair of opposed resilient members each generally of a dogleg-shape, said resilient members being fixed at corresponding ends to a pair of stationary pins, respectively, and having at their other ends a pair of respective eyes for guiding the weft thread therethrough.
3. An apparatus according to claim 1 or claim 2, wherein said feeding means is disposed upstream of said spring means.
4. An apparatus for supplying a weft thread to a weft inserter in a needle loom substantially as herein described with reference to and as illustrated in the accompanying drawings.

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