MILANESE WARP KNITTING MACHINE

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MILANESE Warp Knitting Machine

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This invention relates to a Milanese warp-knitting machine of the type in which two sets of warp threads are moved in opposite directions in such manner that each thread extends from one selvage to the other and crosses the threads traveling in the opposite direction, each set of warp threads being fed over a rail—one over an upper rail and the other over a lower rail—while, at the rail ends at the sides of the machine, the threads at one side are successively lowered from the upper to the lower rail while at the opposite side the threads are successively raised from the lower to the upper rail. In this type of machine the beams carrying the warp threads are usually in the form of bobbins mounted under the machine on an endless chain which moves slowly in time with the shifting of the threads on the rails.

In machines for producing Milanese fabrics of the character above described, satisfactory selvage edges can be produced only with certain kinds of yarn while with yarn of other kinds the selvages are ragged, irregular and unsatisfactory.

One object of the present invention is to provide, in a machine of the above type, means for reinforcing the selvage edges of the fabric.

Another object of this invention is to provide means for feeding to the needles or to certain of the needles of the machine additional or auxiliary yarn threads at the selvages or at other points throughout the width of the fabric; these additional threads being shifted sidewise over a definite number of needles in one direction and then in the opposite direction while the main warp threads travel sidewise in the well known manner above referred to and the additional threads are thus inter-knitted with the usual warp threads. A still further object of my invention is to provide means whereby the auxiliary or additional threads may be fed to the needles by feed mechanism adapted to move transversely within definite limits across the width of the fabric, in both directions, and in proper timed relation to the operation of the machine to provide in the finished fabric reinforcing or ornamenting lines or stripes extending at an angle to the selvage edges so as to produce diagonal lines and so as to produce diamond or other shaped outlines.

With these and other objects in view, my invention consists in the novel construction and arrangement of parts hereinafter described with reference to the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes may be made without departing from the spirit of the invention or sacrificing any of the advantages thereof.

In the drawings Fig. 1 is a sectional somewhat diagrammatic view showing the essential parts of a Milanese warp-knitting machine having applied thereto an attachment according to the present invention; Fig. 2 is an enlarged front view of the attachment for feeding additional yarn at one selvage of the Milanese fabric; Fig. 3 is a cross section of the same taken on the line 3—3 of Fig. 2; Fig. 4 is a view looking on the right-hand end of Fig. 2 and showing the yarn carriers; Fig. 5 is a diagrammatic front view showing an attachment for a Milanese machine for introducing additional threads at intervals throughout the width of the fabric; Fig. 6 is a front view showing part of a Milanese machine with a special attachment for feeding additional threads to produce zig-zag stripes; Fig. 7 is an enlarged cross section taken on the line 7—7 of Fig. 6; Fig. 8 is an enlarged front view partly in section showing the left hand portion of the additional yarn feeding mechanism of Fig. 6; Fig. 9 is a plan view of the same partly in section; Fig. 10 is a cross sectional view taken on the line 10—10 of Fig. 9, and Figs. 11, 12 and 13 are enlarged views showing somewhat diagrammatically three fragments of Milanese fabrics; Fig. 11 showing an ordinary Milanese fabric with a special stripe or reinforcement at the selvage; Fig. 12 showing a similar fabric with a selvage reinforcement and with straight reinforcing or ornamenting lines or stripes at intervals in the width of the fabric, and Fig. 13 showing a Milanese fabric having zigzag lines forming a diamond pattern.

Referring particularly to Fig. 1 the upper rail or "top tier bar" 15 forms a part of the usual "ladder" 16 which comprises also a rear bar 18, and over these bars 15, 18 the warp threads 17 are continuously fed from a series of warp beams or bobbins 18 in the manner well known in the knitting of Milanese fabrics, and at the same time the warp threads 19 are fed from the travelling beams or bobbins 20 over the lower rail or "bottom tier bar" 21. The individual threads of the upper set 17 and those of the lower set 18 are manipulated by grooved transfer points 22 and grooved still-bar points 23 and by take-up points 24, all of which are actuated in the well known manner, the tips of the points 22 being caused to engage the grooves of the points 23 and being raised and lowered also moved sidewise, the tips of the points 23 being caused to engage the grooves of the points 22 and being raised and
lowered and the points 24 being raised and lowered and being also swung towards the points 23 and towards the usual single needle 25 which later are raised and lowered in proper timed relation and in inward movement of the needles 26 and to the movement of the bobbin presser bar 27 and the fabric pressing bar 28, all in the manner well known in the operation of Milanese warp-knitting machines.

While the yarn threads 17, 19 are thus fed to the needles 26 and are moved continuously in opposite directions, auxiliary or extra threads 29 are fed from guide eyes 30 from guides 31 from around guide pins 32 from bobbins 33 (see also Figs. 2, 3 and 4).

Mounted on each side frame of the machine near the selvage of the fabric being produced is a bracket 34 carrying the bobbin 35 and having projecting arms 36, 37 through which a rod 37 is free to slide but is prevented from turning by means of a key 38. This rod 37 carries the extra thread guides 31, 30 and while it is normally driven towards the spring 39 in tension between the bracket 35 and the collar 40 thereon, it is periodically moved towards the right by engagement with the side face on a cam 41 carried by a shaft 42 which may be driven through the medium of a sprocket wheel 43 (Fig. 3). In other suitable or convenient manner from the main cam shaft of the machine so that the guides 30 feeding the threads 29 to the needle 26 are moved sidewise in proper timed relation to the operation of the points 22, 23, 24 and of the other parts of the knitting mechanism so that the threads 29 are thrown to one side of the needle or to the other to form the loops or stitches and to knit the auxiliary or extra thread into the fabric at the selvage, or— as heretofore described—at other points in the width of the fabric.

The knitted fabric shown at Fig. 11 consists of ordinary Milanese fabric 51 with a selavage reinforcing stripe 52, such as could be produced by the attachment above described. Fig. 12 shows an ordinary Milanese fabric 53, having a selavage reinforcing stripe 54, and having additional reinforcing or ornamental stripes 55 at intervals in the width of the fabric.

The yarn feeding mechanism shown in Fig. 5 comprises a cross bar 44 extending from side to side of the machine and carried between brackets 45, 46 mounted on the side frames of the Milanese machine and this bar 44 is engaged at each of its ends by a cam 47 so shaped as to cause the bar to reciprocate in the manner required to lay the extra threads above the usual warp threads supplied in the usual manner. The cross bar 44 carries at intervals throughout its length a number of thread guiding members 48 each of which receives a single thread or a group of threads from a thread supplying bobbin 49 carried on a cross bar or frame 50 mounted on and extending between the upper parts of the brackets 45, 46, and in this manner longitudinal stripes may be formed at the selvages or at any points throughout the width of the fabric as shown particularly at Fig. 12.

Figs. 6 to 10 inclusive show a modified form of attachment that may be adapted for the formation of zig-zag stripes as shown at Fig. 13 of the drawings, a series of zig-zag stripes 56 being arranged alternately between zig-zag stripes 57 in such manner that the points of adjacent zig-zags meet each other at a common point 58 to produce the diamond outline pattern shown at Fig. 13.

As shown at Fig. 6 of the drawings the warp threads 59 are drawn in the usual way from the warp bobbins 60 of the usual Milanese machine, while in other suitable or convenient manner from the cross bar 53 extending between recesses 64 in brackets 65 mounted on the side frames of the Milanese machine, the brackets 65 being removable mounted on the cross bar 53 so that they may be located at desired positions throughout the width of the web of fabric being produced by the Milanese machine. The brackets 65 on the side frames of the machine also support the ends of parallel rods 66, 67 each of which has secured at intervals thereon a series of thread guides 68, having at their lower extremities guide eyes 69 for guiding the threads from the bobbins 61 to the needles of the machine, and additional guide eyes 70, 71 are provided between the eyes 69 and the bobbins 61. At each side of the machine, the ends of the rods 66, 67 are engaged by the face of a cam 72 which is carried on a spindle 73 mounted between brackets 74, 75 on the bracket 65, and secured to the cam 72 is a ratchet wheel 76 to which step-by-step motion in one direction is imparted by a pawl 77 which latter is mounted on the free end of an arm 78 free to rock on the spindle 73. The arm 78 and the pawl 77 are such as the rods 66, 67 are such that a ratchet wheel 76 to which step-by-step motion in one direction is imparted by a pawl 77 which latter is mounted on the free end of an arm 78 free to rock on the spindle 73. The arm 78 and the pawl 77 are such that the winding members 88 thereon are moved step-by-step in opposite directions and are simultaneously reversed in such manner that the threads fed from the yarn carriers on one of the rods say 66 produce the zig-zag lines 56 while the threads from the thread carriers on the other rod 67 produce the zig-zag lines 57.

It will of course be readily understood that the cam or other operating mechanism may be modified—and the positions of the thread carriers 68 on the rods 66, 67 may be varied so as to produce zig-zag lines or combinations of zig-zag or parallel lines of varying forms and arrangements.

Although the drawings and above specification disclose the best mode in which I have contemplated embodying my invention, I desire to be in no way limited to the details of such disclosure, for in the further practical application of my invention, many changes in the form and construction, and in the form of fabric produced thereby, may be made as circumstances require or experience suggests without departing from the spirit of the invention within the scope of the appended claims.

What I claim is:

1. An attachment for feeding auxiliary threads to certain needles of a Milanese warp knitting machine to knit in the fabric a reinforcing band extending in parallel relation to the selavage edges comprising: a bracket adapted to be mounted on the warp knitting machine; a rod disposed in alignment with said rod to have bearing contact with one end thereof, said cam face being provided with high and low portions, the high portion operating to force the rod in one direction and the low portion allowing the rod to 75
move in the reverse direction whereby the thread guides may be reciprocated from one needle to another for transversing the thread repeatedly back and forth across a restricted area of the fabric; ratchet means associated with said member to impart a step by step movement thereto for actuating the latter in timed relation with the operation of the knitting machine; and means connected to the rod and acting to yieldably urge the same into operative engagement with the cam member and move said rod in the reverse direction when the low portion of the cam face is brought in alignment with the associated end of the rod.

3. An attachment for feeding auxiliary threads to certain needles of a Milanese warp knitting machine to knit in the fabric a reinforcing band extending in parallel relation to the selvage edges comprising: a bracket adapted to be mounted on the warp knitting machine; a rod supported in said bracket for longitudinal sliding movement in lengthwise and paralleling relation to the bank of needles; thread guides fixed upon one end of said rod for feeding the auxiliary threads to a limited number of needles; a rotatable member having a cam face disposed in alignment with the rod to have bearing contact with the other end thereof, said cam face being provided with high and low portions, the high portion operating to force the rod in one direction and the low portion allowing the rod to move in the reverse direction whereby the thread guides may be reciprocated from one needle to another for transversing the thread repeatedly back and forth across a restricted area of the fabric; ratchet means associated with said member to impart a step by step movement thereto for actuating the latter in timed relation with the operation of the knitting machine; and means connected to the rod and acting to yieldably urge the same into operative engagement with the cam member and move said rod in the reverse direction when the low portion of the cam face is brought in alignment with the associated end of the rod.

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