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Kohl

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[54] **APPARATUS FOR CONVEYING FILLING THREADS TO A WARP KNITTING MACHINE**

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[51] **Int. Cl.²** **D04B 23/12**

[58] **Field of Search** .... 66/125 R, 84 R, 84 A, 85 R, 66/154 R; 28/1 CL; 139/122 W; 156/439, 440

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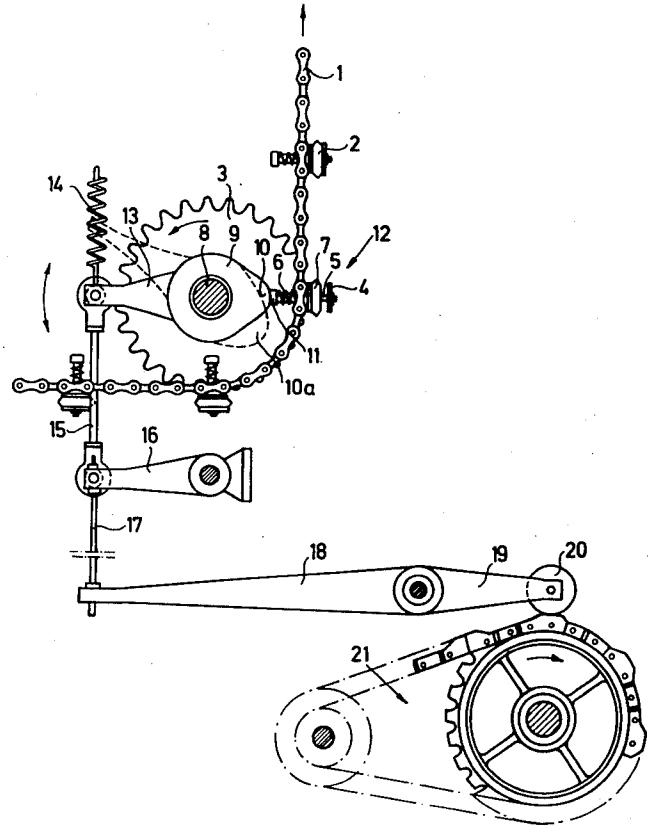
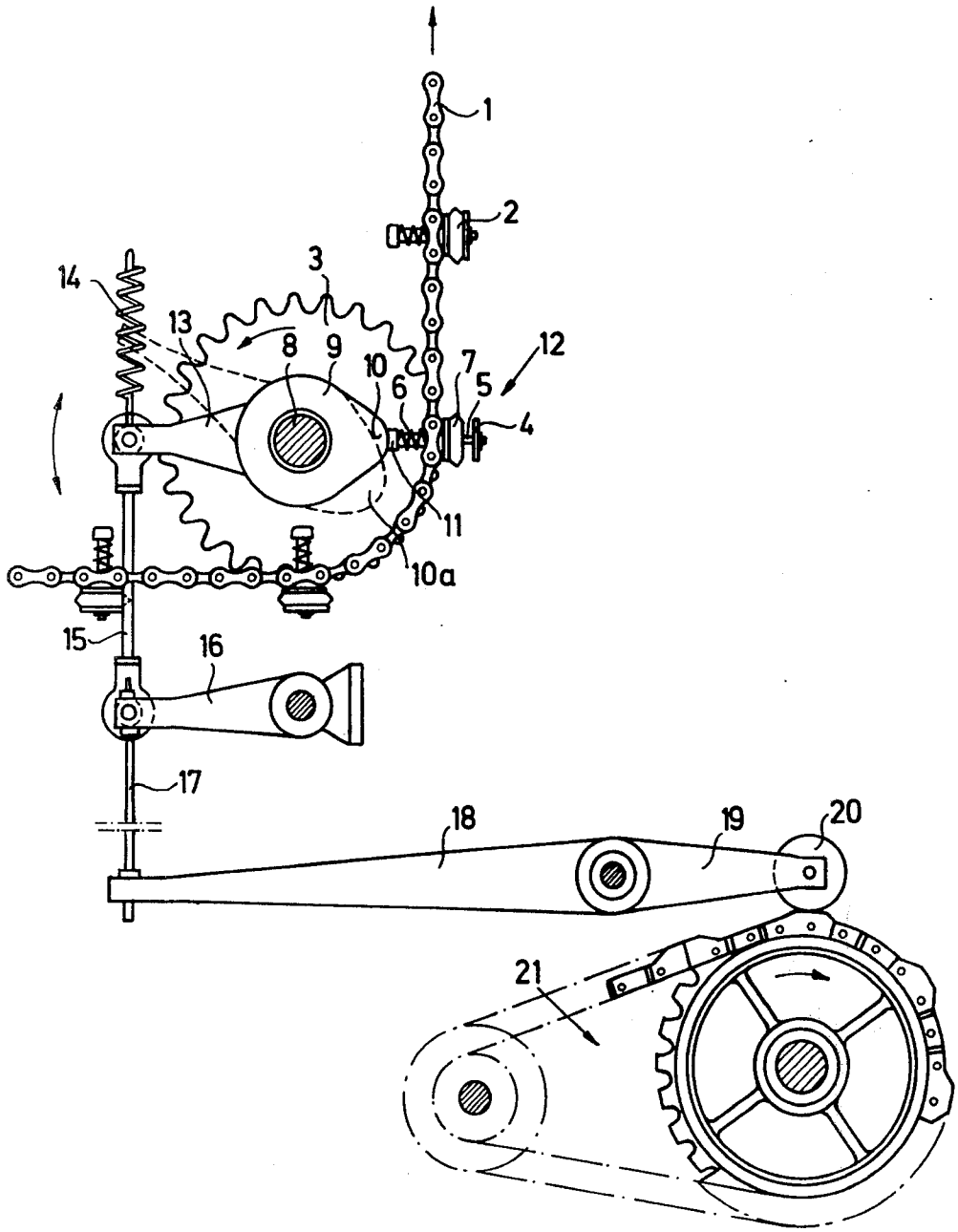
[57] **ABSTRACT**

A filling thread conveyor chain for a warp knitting machine has a plurality of thread clamps spacedly mounted along the chain for sequential movement of the clamps into a position for receiving a respective filling thread from the yarn cones of a filling thread supply chain. A cam is mounted at the thread receiving position for closing the clamps and this cam is operated by the pattern mechanism of the machine.

3 Claims, 1 Drawing Figure

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APPARATUS FOR CONVEYING FILLING THREADS TO A WARP KNITTING MACHINE

The present invention relates to improvements in an apparatus for conveying filling threads to a warp knitting machine.

In such apparatus, the filling thread conveyor chain carries a plurality of thread clamps spacedly mounted along the chain, each thread clamp being sequentially moved into a position for receiving a respective one of the filling threads from the yarn cones carried by an endless filling thread supply chain. In this position, the clamps are operated by a cam so that, at the take-up point, the filling thread may be clamped between the head and anvil of the clamp. Such apparatus is described, for instance, in U.S. Pat. No. 3,364,701, dated Jan. 23, 1968.

If each bracket on the filling thread supply chain carries a cone, a filling thread will be laid in each row of stitches. Pattern variations are obtained by omitting yarn supply cones at selected spacings along the supply chain so that no filling thread is supplied to the conveyor chain at such spacings. Thus, the obtainable pattern variations depend entirely on the structure of the filling thread supply chain. Furthermore, it is not possible to change the pattern during the knitting operation but such change can be effected only by stopping the machine and replacing the supply chain or changing the yarn cone arangement thereon.

It is the primary object of this invention to avoid these disadvantages in the type of apparatus hereinabove described so that pattern and color changes may be effectuated without regard to the structure of the filling thread supply chain and without interrupting the knitting operation.

The above and other objects are accomplished in accordance with the invention by a cam means mounted at the take-up point for the respective filling threads for moving a respective one of the thread clamps upon operation of the cam means between a clamp opening and clamp closing position. A control means is operatively associated with the cam means and a pattern mechanism for operating the cam means in response to the pattern mechanism.

In the illustrated embodiment, the cam means is a cam disc having a cam for closing the clamp upon rotation of the disc.

The above and other objects, advantages and features of the present invention will become more apparent from the following detailed description of a now preferred embodiment thereof, taken in conjunction with the single FIGURE of the accompanying drawing.

In the drawing, there is shown endless filling thread conveyor chain **1** trained about sprocket **3** for continuous movement in the direction of arrow A. Chain **1** has mounted thereon a plurality of thread clamps **2**, the clamps being spaced regularly along the chain and being sequentially moved into a position **12** for receiving a respective one of the filling threads from the yarn cones of a filling thread supply chain (not shown).

As is conventional the clamp **2** comprises a movable clamp head **4** mounted on stem **5** and cooperating with anvil **7**, a helical spring **6** mounted on the stem between anvil **7** and cam follower **11** biasing the head **4** against the anvil **7** to keep the clamp normally closed. A cam disc **9** is keyed to the axle **8** of sprocket **3** to be rotated therewith and has a cam **10** for opening a clamp in the

thread take-up position **12** when the cam **10** engages cam follower **11** on the clamp stem, thus moving the clamp head against the bias of spring **6.** Thus, the clamp is moved from the closed to the open position. The clamp receives the filling thread in the open position at take-up point **12** and is taken along by the clamp as it closes under the pressure of spring **6** as the chain **1** moves on from position **12.** Thus, the filling thread is conveyed to the knitting station where the fabric is being knitted so that the filling thread may be laid therein.

When it is not desired to lay a filling thread, the cam disc **9** is displaced so that the cam assumes position **10*a*** out of alignment with thread take-up point **12.** In this displaced position, the cam will not open the clamp at the thread take-up point when the thread is delivered from the yarn cone but, according to the displacement angle of cam position **10*a***, at a later point when the yarn cone has passed by this point so that no thread will be supplied to thread conveyor chain for laying in the fabric.

The control means for operating the cam means **9, 10** comprises lever arm **13** fixed to cam disc **9** and biased in one direction by return spring **14** tending to move the disc clockwise. The lever arm is also connected to a push rod **15** which is pivoted to one-armed lever **16.** One end of a tension member **17,** which is illustrated by a cable line, is connected to the push rod while the other end thereof is connected to one arm of two-armed lever **18** whose other arm carries follower roller **20** engaged by the chain of pattern mechanism **21.**

Thus, when the pattern mechanism causes the clamp operating cam to be in position **10*a***, no filling thread will be supplied to the machine, thus changing the pattern of the knit fabric at will in accordance with the chosen pattern without interruption of the knitting operation.

I claim:

1. An apparatus for conveying filling threads to a warp knitting machine, comprising

1. a filling thread conveyor chain,
2. a plurality of thread clamps spacedly mounted along the chain,
   a. each of the thread clamps being sequentially moved into a position for receiving a respective one of the filling threads,
3. a cam means mounted at said position for moving a respective one of the thread clamps upon operation of the cam means between a clamp opening and clamp closing position,
4. control means for operating the cam means, and
5. a pattern mechanism,
   a. the control means being operatively associated with the cam means and the pattern mechanism for operating the cam means in response to the pattern mechanism.

2. The apparatus of claim **1,** wherein the cam means is a cam disc having a cam for closing the clamp upon rotation of the cam disc.

3. The apparatus of claim **1,** wherein the control means comprises a return spring tending to move the cam means in one direction and a tension member tending to move the cam means in a direction opposite to the one direction, the tension member being responsive to the pattern mechanism.

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