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Speich

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[54] **APPARATUS FOR MOVING THREAD GUIDE DEVICES OF TEXTILE MACHINES**

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[51] **Int. Cl.** **D03c 13/00,** D03c 3/20

[58] **Field of Search** ..... 139/55–59, 139/82, 84, 88, 317, 319, 71; 66/154 A

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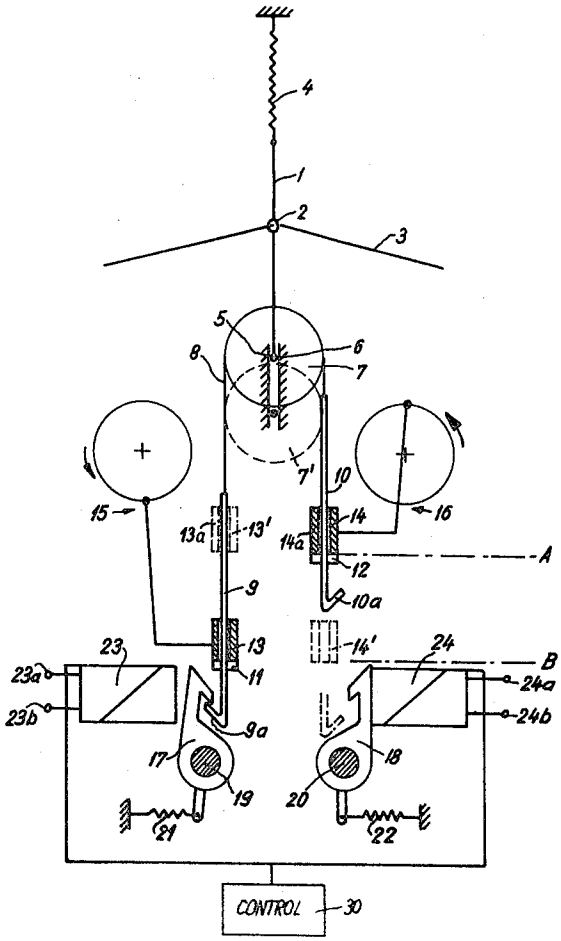
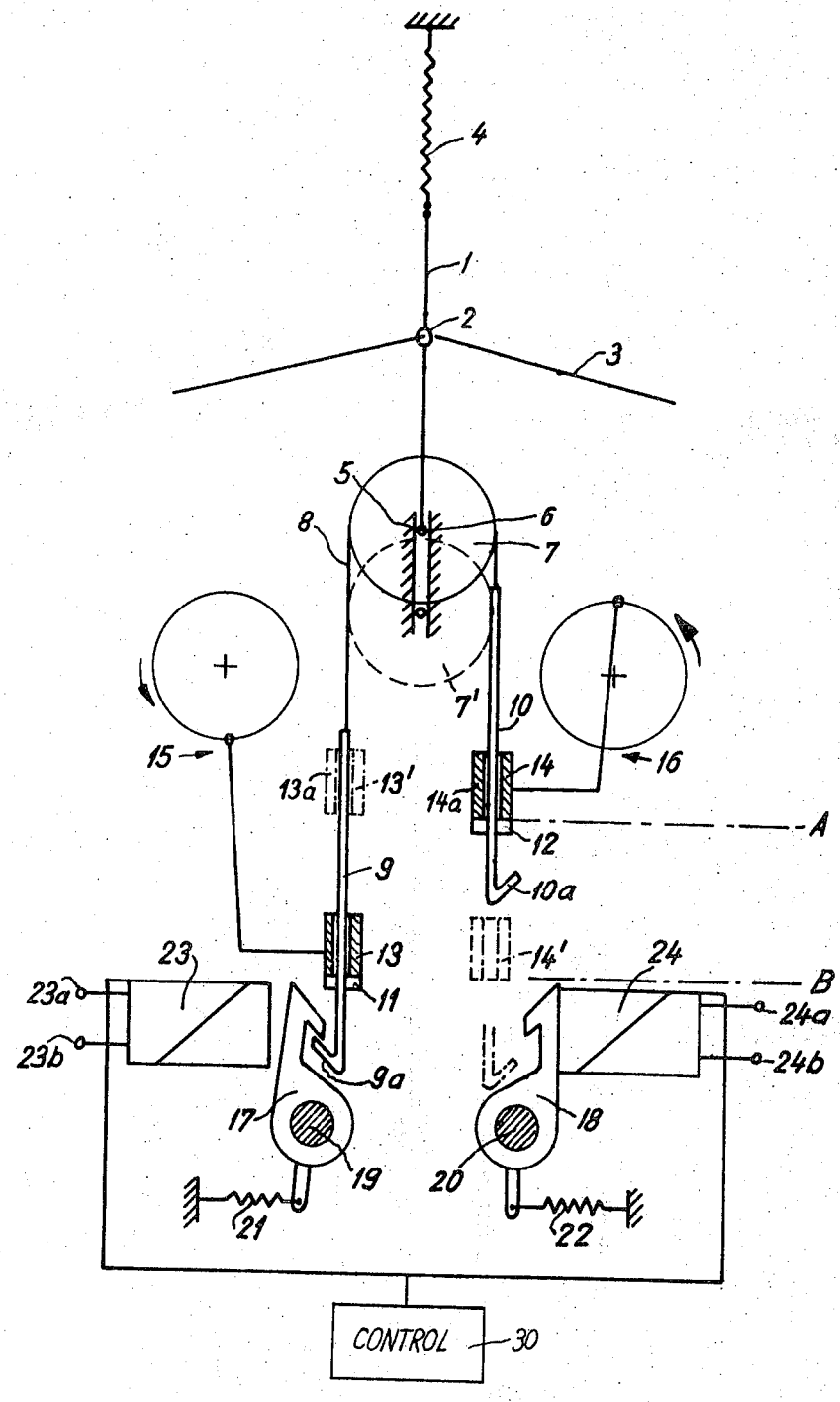
[57] **ABSTRACT**

An apparatus for moving thread guide devices of textile machines wherein two traction elements are provided which move to-and-fro in a translatory fashion in opposition to one another between two terminal positions, these traction elements being coupled with one another by a connection element and via the latter acting upon the thread guide devices. A stationary retaining or holding element is associated with each traction element and each such retaining element selectively retains the associated traction element in one terminal position in accordance with a control program.

7 Claims, 1 Drawing Figure

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APPARATUS FOR MOVING THREAD GUIDE DEVICES OF TEXTILE MACHINES

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved apparatus for moving the thread guide devices of textile machines.

Such type equipment for moving the thread guide devices, such as the shed forming devices of looms, for instance harnesses or heddle wires, filling guide elements of multi-shuttle looms or stitch deposit devices of knitting machines, are known in a great many different variations. With this equipment the threads or yarns guided by the thread guide devices are selectively moved to-and-fro between two positions in accordance with a control program which is dependent upon the desired weaving of the fabric or the deposit of the stitches of the knitted fabric.

All of these known constructions generally possess the drawback that they either are associated with an undesired limitation in the operating speed of the textile machine or are complicated in construction and therefore quite subject to malfunction.

SUMMARY OF THE INVENTION

Hence, it is a primary object of the present invention to provide an improved construction of apparatus for moving the thread guide devices of textile machines in a manner overcoming the aforementioned drawbacks of the prior art proposals.

It is a further object of the present invention to provide a new and improved construction of apparatus for moving the thread guide devices of textile machines in an extremely efficient and reliable fashion, without undesirably limiting the operating speed of the textile machine, and wherein the apparatus itself is of relatively simple construction and design and economical to manufacture.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the inventive apparatus is manifested by the features that there are provided two translatory to-and-fro moving traction elements which move in opposition to one another, that is to say opposite in phase, between two terminal positions. A connection element interconnects these two traction elements with one another and the latter act upon the thread guide devices through the agency of the connection element. Each traction element has associated therewith a stationary retaining or holding element which selectively retains the associated traction element in one terminal position as the function of a control program.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawing wherein the single FIGURE illustrates an exemplary embodiment of apparatus of this development for moving the thread guide devices of textile machines.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Considering now the drawing it will be understood that the single FIGURE thereof schematically depicts an apparatus for moving a thread guide device which, for instance, has been illustrated by way of example as a heddle wire. Of course, instead of a single heddle wire a number thereof could be employed which would be then arranged in a harness frame as is well known in the loom art. Also, it is to be understood that the term "thread," as employed herein, is used in a broader sense as not only encompassing threads as such, but also yarn and other filamentary material as same is generally processed at a textile machine.

Continuing, it will be seen that the heddle wire **1** possesses an eye or eyelet **2** for the throughpassage of a thread **3.** Heddle wire **1** is secured at one end to a spring **4** and at its other end is connected with the pivot shaft **6** of a roller **7.** Guided over such roller **7** is a connection element **8,** for instance, a cable or a chain which is connected at its ends with rod-shaped traction hooks **9** and **10** respectively. Each traction hook **9** and **10** possesses at its free end a hook member **9***a* and **10***a*. At each hook member **9***a* and **10***a* there is furthermore secured a stop or impact element **11** and **12** respectively. Each such stop or impact element **11** and **12** cooperates with a guide device **13** and **14** respectively which can oscillate back-and-forth between two positions A and B.

The guide devices **13** and **14** are driven by a respective schematically illustrated drive mechanism **15** and **16** so as to move in opposed relationship, i.e. phase opposition with respect to one another. Such drive mechanism **15** and **16** can be, for instance, a drive crank. Each of the guide devices **13** and **14** is provided with an opening **13***a* and **14***a* respectively through which there can slidably move the associated traction hook **9** and **10** respectively. Each of the guide devices **13** and **14** work at both sides of the associated traction hook **9** and **10** upon the associated impact or stop element **11** and **12,** so that the forces exerted by each guide device upon the associated stop element act symmetrically with respect to the associated traction hook and thus there does not occur any force moment which acts transversely with respect to the direction of movement of each traction hook.

A respective retaining hook member **17** and **18** which serves as a holding or retaining element is associated with each traction hook **9** and **10** respectively. Each retaining hook member **17** and **18** is rotatably mounted about a stationary shaft or axle **19** and **20** respectively and is connected with a spring **21** and **22** respectively which retains the associated retaining hook member **17** and **18** in a work or effective position in which the retaining hooks can engage behind the hook members **9***a* and **10***a* of the traction hooks **9** and **10** respectively, with the result that the traction hooks are fixedly retained in the corresponding position.

The retaining hooks **17** and **18** are designed as armatures of electromagnets **23** and **24** respectively. If these electromagnets **23** and **24** are energized by delivering current from a suitable and therefore not particularly illustrated supply source to their input terminals **23***a*, **23***b* and **24***a*, **24***b* respectively, then the retaining hooks **17** and **18** respectively, are attracted or activated and moved out of their effectual position into a release po-

sition where they no longer cooperate with the hook members **9***a* and **10***a* of the traction hooks **9** and **10** respectively.

It should be also readily apparent that by carrying out suitable constructional measures the retaining hooks **17** and **18** can be held by the springs **21** and **22** in their release position and by the electromagnets **23** and **24** in their effectual or work position.

By means of the guide devices **13** and **14** which are driven in phase opposition so as to move to-and-fro between both of the terminal positions A and B the traction hooks **9** and **10** are likewise moved in phase opposition between two terminal positions, and specifically for such length of time as the retaining hooks are held in their release or ineffectual position.

During the movement of the guide devices **13** and **14** from the position A into the position B such bear upon the associated stop or impact elements **11** and **12** and bring about movement of the traction hooks **9** and **10** against the retaining hooks **17** and **18.** If the guide devices **13** and **14** move from the position B into the position A, then the traction hooks **9** and **10,** provided that they are not fixedly held by their associated retaining hook, are moved back through the action of the force of the spring **4** which acts upon the roller **7.**

If as described the traction hooks **9** and **10** are moved to-and-fro in phase opposition between their two terminal positions then the roller **7,** under the action of the spring **4,** will remain in its upper terminal position depicted in the drawing.

Now if one of the electromagnets, for instance the electromagnet **23,** is de-energized at the moment when the associated traction hook **9** is located in its lower terminal position, then, the retaining hook **17** will be located, under the action of the spring **21,** in its effectual or work position in which the retaining hook **17** holds or retains the traction hook **9** positionally fixed. If during the next working cycle the other traction hook **10** is moved in the described manner towards the retaining hook **18,** then, the roller **7** together with its pivot shaft or axle **6** will be guided in the guide **5,** against the force of the spring **4,** so as to move into the position **7'** depicted in phantom lines in the drawing, with the result that the heddle wire **1** and the thread **3** or the like is likewise moved in the same direction.

The roller **6** remains for such length of time in its position **7'** as both traction hooks **9** and **10** are retained in their lower terminal position.

The energization and de-energization of the electromagnets **23** and **24** and therefore the movement of the retaining hooks **17** and **18** occurs selectively by means of a control program as a function of the momentary position of the thread **3** which is determined by the desired weaving or connection of the fabric or the deposition of the stitches of the knitted fabric. Such control program can be provided in known manner, for instance, in the form of a punched card or a magnetic storage upon a magnetic type, as is well known in the art. Hence, the program control has only been conveniently schematically indicated by reference character **30.**

With the described exemplary embodiment the electromagnets **23** and **24** must be designed in such a way that during energization thereof the retaining hooks **17** and **18** which serve as the armatures of the magnets are retracted. It is also possible to provide devices, which are controlled by the control program such that the corresponding retaining hooks is moved mechanically into its release position in which it bears at the magnet and then need only be fixedly held in this position thereby.

It is also possible to design the retaining hooks not as themselves armatures of electromagnets, rather to connect such via a rod with a separate magnet armature serving as the actuation element of a magnet.

For moving the retaining hooks from the effectual or work position into the ineffectual or release position and vice versa, instead of the magnets, there can be provided a preliminary needlework or needle arrangement.

In the drawing the thread guide device is illustrated as directly engaging at the roller **7.** However, it is possible to interpose further rollers between the roller **7** and the thread guide device **1** in order to accommodate the magnitude of the displacement of the eyelet **2** and therefore the thread **3** for a given displacement path of the shaft **6** of the roller **7.**

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims. Accordingly,

What is claimed is:

1. An apparatus for moving a single thread guide device of textile machines, said apparatus comprising two traction elements, means for moving said two traction elements to-and-fro in translatory fashion in opposition to one another between two terminal positions, connection means inter-connecting said two traction elements with one another and acting upon the single thread guide device, a stationary retaining element operatively associated with each traction element for selectively retaining the associated traction element in one terminal position as a function of a control program to selectively vary the position of the single thread guide device.

2. The apparatus as defined in claim **1,** further including a roller, said connection element being guided about said roller, a spring element, means operatively connecting said roller with said thread guide device, means connecting said spring element to said thread guide device for resiliently resisting movement thereof by said roller with said roller being displaceable away from said spring by said connecting element; said traction elements each being of substantially rod-shaped configuration and possessing a hook member, said means for moving said traction elements including guide mechanisms cooperative with said rod-shaped traction elements, and drive means for driving said guide mechanisms between two positions to-and-fro in opposed relationship and generally in the effective direction of said spring element, each retaining element having a retaining hook member rotatable about a stationary shaft, means for rotating each retaining hook member between a release position and an effectual position, and each retaining hook member in its effectual position engaging with the hook member of the associated traction element.

3. The apparatus as defined in claim **2,** wherein each traction element is displaceably guided through the associated guide mechanism and possesses a stop element which cooperates with the associated guide mechanism.

4. The apparatus as defined in claim 2, said means for rotating each retaining hook member including an electromagnet for retaining each associated retaining hook member in one of its said positions, and a spring means working in opposition to said electromagnet for retaining each retaining hook member in the other of its said positions.

5. The apparatus as defined in claim 4, wherein each retaining hook member defines a magnetic armature of the associated electromagnet.

6. The apparatus as defined in claim 5, wherein each retaining hook member is coupled with a return mechanism which, as a function of the control program, serves to bring the associated retaining hook member, against the action of the spring means, so as to bear at the associated electromagnet.

7. The apparatus as defined in claim 2, wherein the retaining hook members are coupled with a preliminary needle arrangement which brings about rotation of the retaining hook members from their one into their other position.

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