

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 096 048 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
02.05.2001 Bulletin 2001/18

(51) Int. Cl.⁷: **D03C 3/32**, D03D 51/02,
D03C 3/26, D03D 35/00

(21) Application number: **00120131.8**

(22) Date of filing: **25.09.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **28.09.1999 IT MI992011**

(71) Applicant: **TEXTILMA AG**
6052 Hergiswil / NW (CH)

(72) Inventor: **Villa, Carlo**
20066 Melzo (MI) (IT)

(74) Representative:
Schmauder, Klaus Dieter et al
Schmauder & Partner AG
Patentanwälte
Zwängiweg 7
8038 Zürich (CH)

(54) **Automatic needle loom for the manufacture of ribbons**

(57) A device for textile product manufacture comprising a jacquard system (3) for warp thread shed formation characterised in that the jacquard operation is driven by a synchronous motor (1) separated from the motor (2) which drives the weaving loom movement and synchronised with the same.

EP 1 096 048 A2

Description

[0001] The present invention concerns an improved automatic needle loom of the kind where the warp thread shed formation is controlled by a Jacquard system.

[0002] More particularly the present invention is directed to a needle loom for the manufacture of narrow fabrics wherein the operating synchronism between weaving loom and jacquard system is accomplished by means of separate motors.

[0003] Weaving looms are known in which the shed formation is controlled by a jacquard system. In said looms the movement is driven by the weaving loom main shaft that, through appropriated gear connections transmits the movement to Jacquard system allowing shed formation with a required synchronism.

[0004] Connection between weaving loom driving shaft and corresponding jacquard elements is quite complicated and it does not allow any independent programming of jacquard operating speed within a single cycle. Also the cost of the devices necessary to assure the appropriate operating synchronism is quite high.

[0005] Moreover the mechanical connection system between weaving loom and jacquard requires a specific attention and care as well as a very qualified personnel to assemble and disassemble the weaving loom/jacquard system. In addition being the weaving loom/jacquard system very cumbersome on a vertical direction, it is not possible to transport it in an assembled form.

[0006] On the other hand using mechanical means to connect jacquard to weaving loom results in a high operating noisy that may reach levels unacceptable according to the present law. It has to be taken in consideration that accepted noise values would be more and more lower because of the authority attention to the noise pollution problem. Furthermore it has also to consider that the use of mechanical means to connect weaving loom to jacquard device would result in a rapid wear of the above mechanical mean which requires frequent repairing to re-establish the weaving loom - jacquard movement synchronism.

[0007] US - A - 5,613,526 discloses a system consisting of a series of independent motors controlling shaft movement. Said motors may be of the kind of brushless motors.

[0008] The use of plurality of brushless motors implies quite high costs. Such a high expense may be justified only by a very specific and expensive product manufacturing.

[0009] It is an object of the present invention a device for textile product manufacture comprising a jacquard system for warp thread shed formation in which jacquard operation is driven by a motor independent on the motor which drives the weaving loom movement.

[0010] It is a second object of the present invention a device for narrow fabric manufacture allowing particu-

larly low noise level, reduced repair necessity to re-establish the synchronism between Jacquard and weaving looms, a simplified assembly which allows the joint transportation of the constitutive elements (Jacquard and weaving loom) without separating same and without requiring qualified personnel to reassemble the system.

[0011] The above objects are met by the apparatus according to the present invention which comprises a jacquard system for warp thread shed formation wherein the synchronism between jacquard and weaving loom is assured by two separate motors, the motor controlling jacquard movement being a direct current supplied synchronous motor, e.g. a brushless motor.

[0012] Preferably the synchronism between the jacquard and weaving loom is assured by two synchronous motors loom supplied by direct current of the kind of brushless motors or equivalent which allows, in a easy way, the weaving loom shaft movement programming as well as a very precisely definition of the rotation speed ratio of the driving shafts.

[0013] The latter embodiment assures a good operation without any overheating, even in the low running phase (about 60 rpm) of the weaving driving motor, therefore eliminates the necessity of an auxiliary geared motor and reduces the overall cost and size of the apparatus.

[0014] Moreover, as abovesaid, the use of direct current supplied synchronous motor as the brushless motor or an equivalent one, enables, contrary to three-phase motors to prefix the operating speed with a very high precision. In fact, the ratio of revolution number of the weaving loom shaft and the revolution number of jacquard is generally two: i.e. for each revolution of jacquard shaft, the weaving loom shaft makes two revolutions. In conventional looms such a ratio is obtained by mechanical connection by using gear wheels connected by means of belts or chains or it has been suggested to use two different conventional motors (asynchronous, three-phase motors) driven on electrical axis and controlled by appropriate inverters. Such embodiment has the inconvenient of a reduced efficiency at low running and an imperfect synchronism.

[0015] Beside of assuring a perfect synchronism of the transmission ratio between jacquard and weaving loom during all operating conditions (normal running, low running, acceleration ramp, deceleration ramp, emergency stop), the use of two brushless motors or equivalent ones, according to the present invention, allows to maintain said synchronism even varying the speed within a single revolution, of the brushless motor shaft.

[0016] Therefore, even keeping unchanged the overall revolution ratio between revolution number per time units of the jacquard driving shaft and the weaving loom driving shaft it is possible to reduce the speed where necessary and then increase the speed in order to keep a constant ratio. This embodiment is only

obtained with the use of a brushless motor to drive the jacquard. This embodiment facilitates the jacquard system operations during the phase in which the knives contact the hooks to select the hooks.

[0017] In fact by slowing down the impact speed between rising knives and hooks fastened to magnets and reducing therefore hooks selection time a more safe operation is obtained together with a reduction of mechanical stress of rotation elements that makes possible an increase of the jacquard operating speed.

[0018] Even though the present invention is applicable to any weaving system using a jacquard system for the warp thread shed formation, the device according to this invention is advantageously applicable to needle weaving looms for the manufacture of narrow ribbons, preferably the needle weaving looms for the label production.

[0019] Therefore the attached drawing cannot be interpreted as a limitation of the present invention but only as illustrative thereof.

Fig 1 is a schematic view of a jacquard system applied to a needle weaving loom according to the present invention for the manufacture of ribbon labels.

Fig 2 is a diagram showing the speed course of the jacquard and the needle weaving loom motors as a function of the time.

Fig 3 is a schematic view of a mechanical system for the control of the jacquard upward position in the assembling phase.

[0020] In the figures analogous elements have the same numerical reference.

[0021] In fig. 1, 1 is brushless motor shaft driving the drum rotation for the hook movement and selection; 2 is the brushless motor driving the needle weaving loom, 3 is the complex of the jacquard comprising elements; 4 is the warp beam supplying warp thread, while 5 and 6 are smaller beam supplying the selvedge thread. 7 is the jacquard system supporting plate as well as its brushless motor. Plated 7 can be lowered down as it is illustrated in fig. 3 showing the jacquard-waving loom complex in a ready for shipping phase. The lowered jacquard-waving loom complex can be shipped using standard size containers. Fig. 2 is a diagram reporting on the axis of abscissa the angles relevant to the rotation of the jacquard and weaving loom driving motor shafts. As ordinates the shafts rotation speed in revolutions per minute is reported.

[0022] As it is evident from the figure, the jacquard driving motor shaft rotates at an average speed that is one half of the speed of the weaving loom driving motor shaft. However, while the rotation speed of the weaving loom driving motor shaft is always constant, the rotation speed of the jacquard driving motor shaft change within each single revolution angle. As a matter of fact, while the rotation speed of the weaving loom driving motor

shaft is shown as a straight line parallel to axis of abscissae (A), the speed of jacquard driving motor shaft is shown as a sinusoidal line (C) since said speed is higher in the ranges 0° to 90° and 180° to 270° , but is lower in the in the ranges 90° to 180° and 270° to 360° . As it can be derived from fig. 2, the speed ratio of two speeds: weaving loom and jacquard driving shafts is equal to two at beginning and the end of each cycle, while during the cycle it oscillates around his value. In fig. 2 it has been indicated with (B) the course of conventional jacquard system wherein the Jacquard driving shaft rotates at constant speed.

Claims

1. A device for textile product manufacture comprising a jacquard system for warp thread shed formation characterised in that the jacquard operation is driven by a synchronous motor separated from the motor which drives the weaving loom movement and synchronised with the same.
2. A device for textile product manufacture comprising a jacquard system according to claim 1, characterised in that the movement synchronism between jacquard and weaving loom is assured by two separate motors, the jacquard driving motor being a synchronous direct current operated motor of the kind of brushless motor.
3. A device for textile product manufacture comprising a jacquard system for warp thread shed formation according to one or more of preceding claims characterised in that the synchronism of the jacquard system and weaving loom movements is assured by two synchronous direct current operated motors of the kind of the brushless motors or equivalent.
4. A device for textile product manufacture comprising a jacquard system for warp thread shed formation according to one or more of preceding claims characterised in that the overall ratio between the number of revolutions per time unit of the jacquard driving motor shaft and weaving loom driving motor shaft is kept constant, but said ratio is changed within each single cycle.
5. A device for textile product manufacture comprising a jacquard system for warp thread shed formation according to claim 4 characterised in that the ratio between the speed of the jacquard driving motor shaft and weaving loom driving motor shaft is changed by reducing the jacquard driving motor shaft in the phase in which the knives are in contact with hooks for the hook selection and by increasing such a speed in the subsequent phases.
6. A device for textile product manufacture comprising

a jacquard system for warp thread shed formation according to one or more of preceding claims characterised in that the jacquard system and its driving motor are placed on a plate that can be lowered in order to reduce its size when the device has to be shipped. 5

10

15

20

25

30

35

40

45

50

55

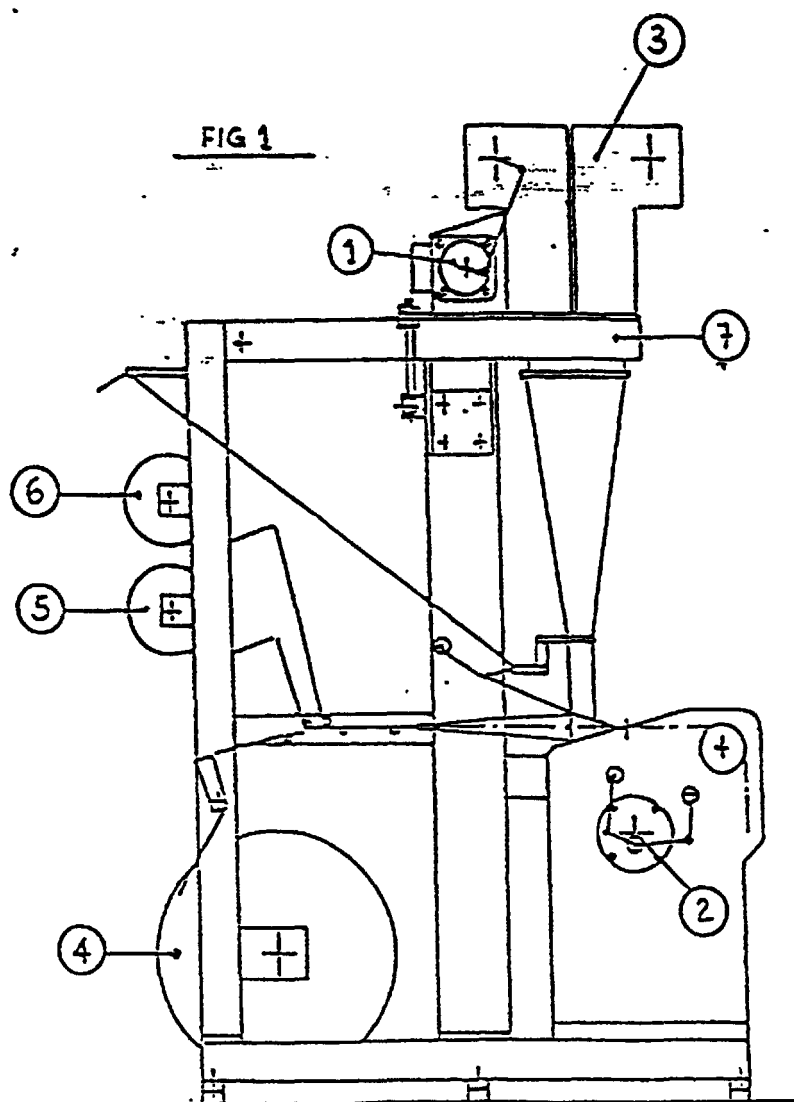


FIG 2

