United States Patent [19]

Wolstencroft

[11] **3,918,501**

[45] **Nov. 11, 1975**

[54] **FEEDER FOR TAPE WEAVING MACHINE**

[75] Inventor: **Michael John Wolstencroft,** Kingston, Canada

[73] Assignee: **Du Pont of Canada Ltd.,** Montreal, Canada

[22] Filed: **June 18, 1974**

[21] Appl. No.: **481,373**

[30] **Foreign Application Priority Data**

June 21, 1973 United Kingdom 29604/73

[52] **U.S. Cl.** ..... **139/122 H**

[51] **Int. Cl.**[2] **D03D 47/34**

[58] **Field of Search** ..... 139/122 R, 122 H, 122 W, 139/127 P, 127 R, 116; 66/125 R, 132 R, 132 T, 86 L; 226/97

[56] **References Cited**

UNITED STATES PATENTS

3,233,634	2/1966	Kobayashi	139/127 P
3,575,217	4/1971	Pfarrwaller	139/122 H
3,580,444	5/1971	Van Mullekom	226/97
3,669,328	6/1972	Castelli	226/97
3,727,033	4/1973	Bassist	66/86 L
3,731,713	5/1973	Lachapelle et al.	139/122 H
3,799,211	3/1974	Klinecky et al.	139/122 H
3,799,212	3/1974	Stanislav	139/122 H
3,825,198	7/1974	Oehninger	139/122 H

FOREIGN PATENTS OR APPLICATIONS

1,240,461	7/1971	United Kingdom	139/122 H
1,510,153	12/1967	France	139/122 H

Primary Examiner—James Kee Chi

[57] **ABSTRACT**

An apparatus is disclosed for feeding flat weft tape from a supply package to a loom in which the weft tape supply package is rotatably mounted outside the warp shed. The apparatus comprises a rotatable chuck adapted to support the weft tape package; means to intermittently rotate the rotatable chuck; a weft tape storage device; an aspirator adapted to draw the weft tape tangentially from the rotating supply package and feed it into the weft tape storage device; weft tape insertion means on the loom adapted to draw the tape from the storage device and insert it into the warp shed of the loom; control means for the means to intermittently rotate the rotatable chuck adapted to synchronize the starting and the stopping of the chuck with the starting and the stopping of the loom; a course control means adapted to adjust the rotation of the chuck such that the surface of the supply package moves at approximately the speed required to unwind the same length of weft tape as is inserted into the warp shed of the loom by the weft insertion means, and a fine control within the weft storage device and actuated by the length of tape in the storage device adapted to more accurately adjust the rotation of the chuck. The apparatus is useful in the weaving of fabric from flat tapes, e.g., flat polyolefin tapes.

3 Claims, 3 Drawing Figures

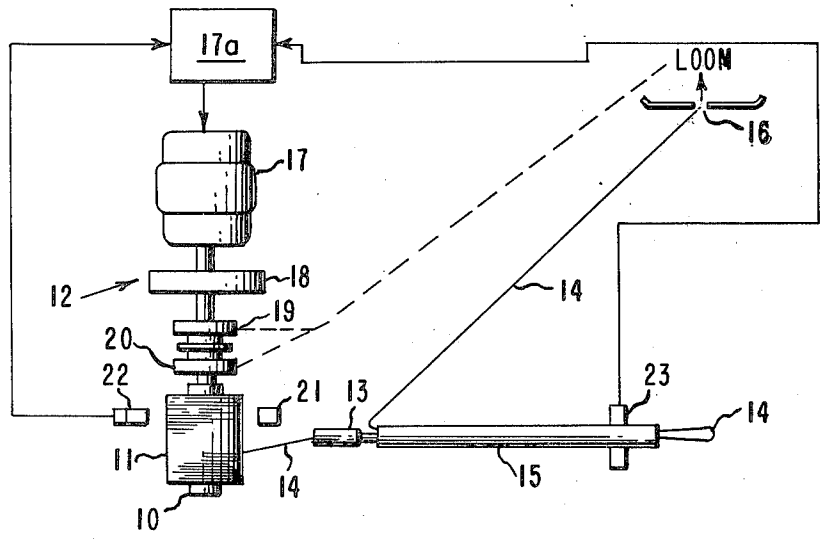


FIG. 1

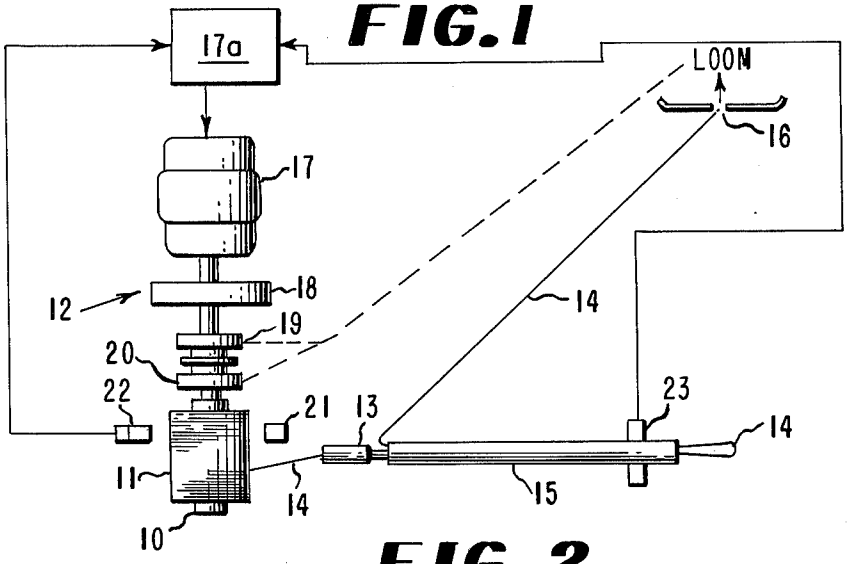


FIG. 2

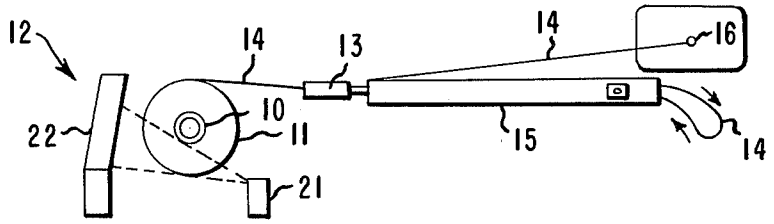
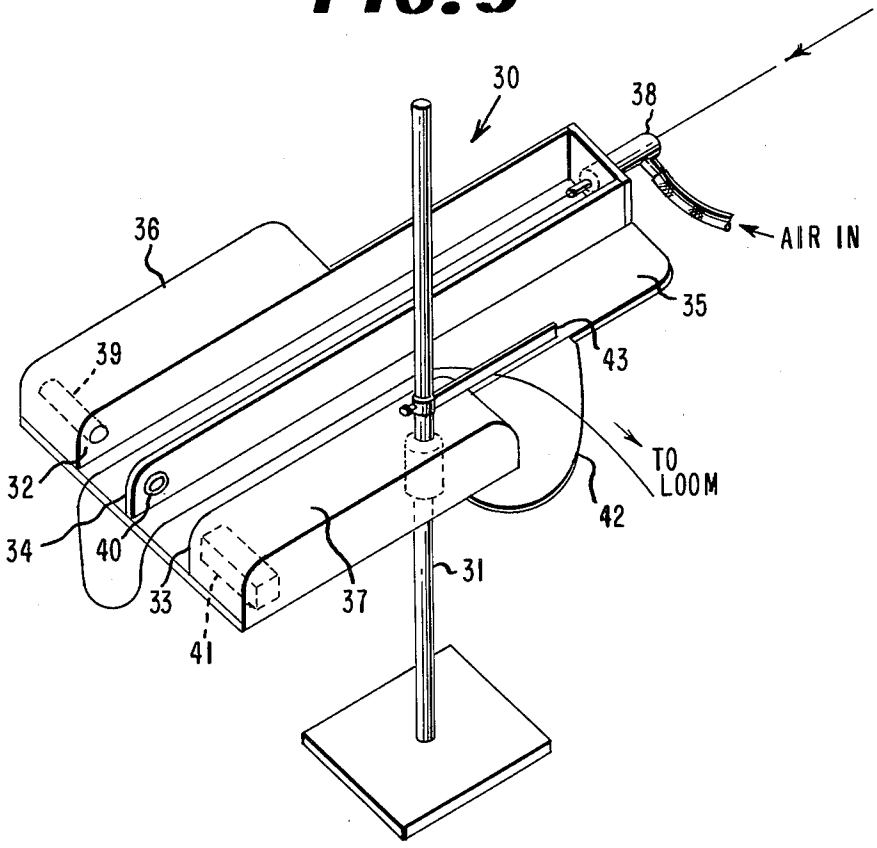


FIG. 3



FEEDER FOR TAPE WEAVING MACHINE

BACKGROUND OF THE INVENTION

This invention relates to the weaving of fabrics from flat tapes and more particularly to the weaving of fabrics from flat tapes on a loom in which the weft package is located outside the warp shed.

It is common practice in the art of weaving flat tapes on the above type of loom to have the weft supply package remain stationary at one side of the loom and to have the weft tape drawn from this package over the end of the package and inserted into the shed formed by the warp tapes by one or more jets, grippers, rapiers or suction devices. After each weft tape insertion, the tape is released from the gripper or rapier and severed from the supply package by a cutting or burning device. After each weft tape has been severed, the new end of the tape is gripped by the weft insertion system and inserted into the shed. The feeding of the weft tape, therefore, is intermittent and various temporary weft storage devices have been provided between the weft supply package and the shed in order to keep the tension in the weft tape reasonably constant.

As the flat weft tape is drawn over the end of the supply package (wound with zero twist weft tape), two folds are made in the tape for every **360°** turn of tape removed from the package. For a new package of say **20** inches in diameter, this leads to an average distance between folds in the weft tapes of **31.4** inches. As the package decreases in size and reaches the core diameter, say **3⅝** inches, the average distance between the folds in the weft tapes decreases to **5.7** inches. These folds in the weft tapes have undesirable effects on the woven fabric. For example, each fold represents a potential weak spot in the fabric; if the woven fabric is subsequently extrusion coated, the folds can cause unevenness in the coating which makes it necessary to apply a thicker coating than would otherwise be required; if uncoated woven fabric is printed, special printing techniques are required to avoid printing defects which can be caused by the folds; if the woven fabric is used for carpet backing, the folds can cause needle deflection resulting in uneven tufting; and woven fabric having folds in its weft tapes is not aesthetically appealing.

It is an object of the present invention to provide apparatus for feeding flat weft tapes from a weft supply package to a loom which will greatly reduce the number of folds in the weft tapes fed to the loom.

SUMMARY OF THE INVENTION

In an apparatus for feeding flat weft tape from a supply package to a loom that includes a weft tape insertion means on the loom adapted to draw the tape from the package and insert it into the warp shed of the loom, the improvement comprising:

a rotatable driven chuck for supporting the weft tape supply package;

a weft tape storage device located between the supply package and the weft tape insertion means; and

an aspirator for drawing the weft tape tangentially from the package and feeding the weft tape into the weft tape storage device.

In one embodiment of the present invention, there is provided a means to intermittently rotate the rotatable chuck which comprises a variable speed motor, a flywheel, a clutch and a brake and a control means, all coupled to the motor; the means to intermittently rotate the rotatable chuck is actuated by the loom. The weft tape storage device comprises an open-ended tube adapted to contain a loop of weft tape which is fed in and drawn out of one end of the tube. There is also provided a coarse control means which comprises a motor speed controller in combination with a photocell arrangement that senses the diameter of the weft package and controls motor speed accordingly, and a fine control means which comprises a photocell loop detector positioned in the weft tape storage tube that also is combined with the motor speed controller to adjust the rotation of the chuck according to the amount of tape in the tube.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a plan view of one embodiment of the present invention for feeding flat weft tape from a supply package to a loom;

FIG. **2** shows in elevation the embodiment of FIG. **1**;

FIG. **3** shows a schematic representation of an alternative weft tape storage device.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

In the embodiment shown in FIGS. **1** and **2** of the drawings, a rotatable chuck **10** supports a weft tape supply package **11.** Means to intermittently rotate the chuck **10** are designated by the numeral **12.** An air powered aspirator **13** receives the weft tape **14** from the intermittently rotating supply package **11** and feeds it to a weft tape storage tube **15.** Weft tape insertion means (not shown) intermittently draw the weft tape from the storage tube **15** through loom guide **16** and insert it into the warp shed of the loom. The weft tape **14** enters and exits the same end of storage tube **15,** thus a loop of weft tape is present in storage tube **15.** The means to intermittently rotate the chuck **10** designated by the numeral **12** consists of a variable speed motor **17,** a flywheel **18,** a clutch **19** and a brake **20.** A light source **21** and an array of photocells **22** cooperate to measure the diameter of supply package **11.** A photocell loop detector **23** detects the presence or absence of a loop of weft tape in storage tube **15.** A clutch-brake control (not shown) for which a signal may be taken from the loom disengages the clutch **19** and applies the brake **20** each time the loom stops and engages the clutch **19** and releases the brake **20** each time the loom starts, i.e., the loom the clutch **19** and the brake **20** are operatively connected as indicated by the dashed line from the loom to these elements. A signal from the array of photocells **22** fed to motor controller **17***a* provides coarse speed control for the motor **17,** i.e., the signal adjusts the speed of the motor **17,** through controller **17***a*, such that the surface speed of the supply package **11** is approximately that required to unwind the same length of tape as is inserted into the warp shed by the weft tape insertion means. A signal from the photocell loop detector **23** also fed through controller **17***a* provides fine speed control for the motor **17,** i.e., the signal adjusts the speed of the motor **17,** through controller **17***a*, such that the end of the loop of weft tape in the storage tube **15** is at, or near, the photocell loop detector **23.**

The variable speed motor **17** is directly coupled to the flywheel **18** to increase the moment of inertia of the

rotor of motor **17** and thereby to reduce sudden speed fluctuations during periods of maximum acceleration. Drive from the motor **17** to the chuck **10** is transmitted through the clutch **19.** Each time the loom is stopped for any reason, the clutch **19** is disengaged and brake **20** is applied by the clutch-brake control; thus allowing the motor **17** to continue to rotate while the chuck **10** is rapidly decelerated to rest and held firmly by the brake **20** until the loom is again started.

The string up and start up of the apparatus for feeding flat weft tape from the supply package to the loom proceeds as follows:

1. a full weft tape supply package **11** is placed on the chuck **10** and locked in position;
2. the clutch-brake control is put on manual control;
3. the end of the weft tape from the supply package **11** is passed through the aspirator **13** and a loop of tape is formed in the storage tube **15**;
4. the end of the weft tape from the storage tube **15** is passed through the loom guide **16** to the weft tape insertion means;
5. the clutch-brake control is put on automatic control;
6. a signal from the array of photocells **22** of the coarse speed control adjusts the speed of motor **17** (based on the diameter of supply package **11**) to give approximately the surface speed required for supply package **11**;
7. the loom is started up in the usual manner; and
8. a signal from the photocell loop detector **23** provides fine speed control by adjusting the speed of the motor **17** such that the end of the loop of weft tape in the storage tube **15** is at or near the photocell loop detector **23.**

A cam operated control driven by a timing mechanism may be used in place of the light source **21** and the array of photocells **22** to provide coarse speed control for motor **17.**

FIG. **3** shows a portion of another embodiment of the invention in which a different weft tape storage device is employed. In FIG. **3,** an alternative weft tape storage device (to the weft tape storage tube **15** of FIG. **1**) is designated generally by the numeral **30.** Weft tape storage device **30,** which is in the form of an open E-shaped trough, is supported by a support stand **31.** The E-shaped trough is formed by outer walls **32** and **33,** by a partition wall **34,** and by a bottom **35.** Skirt guards **36** and **37** extend out horizontally from the upper surfaces of outer walls **32** and **33,** respectively. An aspirator **38** receives the weft tape from the supply package and feeds it into the weft tape storage device **30.** An on-off switch on the air supply to the aspirator **38** is tied in with the clutch-brake controls such that air is supplied to the aspirator each time the clutch is engaged and air is shut off to the aspirator each time the brake is put on. A light source **39,** a lens **40** and a photocell **41** cooperate to form a loop detector in tape storage device **30.** A deflector plate **42,** which forms an extension of bottom **35** and loop guide **43** are also provided.

Air to the aspirator **38** is supplied only when weft tape is being supplied to the storage device **30** from the supply package and when tape is being withdrawn from the storage device **30** by the weft tape insertion means. This feature prevents fibrillation of the weft tape each time the weft tape is stopped in the tape storage device **30.** If static build-up on the weft tape in the tape storage device **30** occurs, it is advantageous to provide a fluidizing means part way down the trough formed by outer wall **32** and partition wall **34.** The on-off control on the air suppply to the aspirator **38** may also be used to control the air supply to this fluidizing means. Skirt guards **36** and **37** prevent the loop in the end of the weft tape from snagging on the light source **39** and the photocell **41** of the loop detector. The deflector plate **42** and the loop guide **43** cooperate to prevent snagging of the weft tape at the point where it leaves the weft tape storage device **30.** The loop detector provides fine control for the motor in the same manner as described above for the motor in the same manner as described above for the loop detector **23** in FIG. **1,** i.e., a signal from the loop detector gradually slows down the motor when there is weft tape in front of the lens **40** and gradually speeds up the motor when there is no weft tape in front of the lens **40.** Each time the loop in the weft tape becomes shorter than the partition wall **34,** the loop rides up on the top of the partition wall **34** away from the lens **40.** The signal from the loop detector thus adjusts the speed of the motor such that the loop in the weft tape is always approximately the same length as the partition wall **34.**

With the apparatus shown in FIG. **1** for feeding flat weft tape from a supply package to a loom, there may be tendency for folds to develop in the flat weft tape at the point where the tape leaves the end of the tape storage tube **15** on the way to the weft tape insertion means. The intermittent use of weft tape by the loom causes a loose loop of tape to fly away from the end of storage tube **15** under its own inertia after each weft tape insertion by the loom. On subsequent weft tape insertions, when the loose loop is temporarily straightened out, a fold can develop in the weft tape. With the weft tape storage device **30** of FIG. **3,** there may be much less tendency for folds to develop. The weft tape is withdrawn by the weft tape insertion means from the side of the tape storage device **30** and the weft tape, which flies out of the storage device **30** under its own inertia after each weft tape insertion, is supported as a control loop on bottom **35** and deflector plate **42.** On the next weft tape insertion, the controlled loop is temporarily straightened without a fold developing in the tape.

The following Example illustrates the invention without limiting its scope:

EXAMPLE

The apparatus shown in FIGS. **1** and **2** of the drawings for feeding flat weft tape from a supply package to a loom was installed on a loom known as a **130**-inch SULZER* weaving machine available from Sulzer Brothers Limited, Winterthur, Switzerland.

*Denotes trade mark

A fabric having an **8** × **8** construction was woven at a speed of **223** picks per minute ±**1½.** The warp and weft tapes were **0.002** in. thick by **0.100** in. wide high density polyethylene.

The operation of the apparatus was as hereinbefore described and illustrated in FIGS. **1** and **2.** Some folds developed in the weft tape **14** at the exit end of the weft tape storage tube **15.** The intermittent use of the weft tape by the loom caused a loose loop of tape to fly away from the end of storage tube **15** under its own inertia after each weft insertion by the loom. On subsequent weft tape insertions, some folds were developed in the

weft tape. The weft tape storage device of FIG. **3** was prepared later to overcome this problem.

A total of **10.5** square yards of fabric was woven. The average distance between turns in the weft tapes was **180** inches. When fabric was woven from the same weft tape supply package with tape take-off over the end of the package according to the prior art, the average distance between turns in the weft tapes was **10.25** inches.

What is claimed is:

1. In an apparatus for feeding flat weft tape from a supply package to a loom that includes a weft tape insertion means on the loom adapted to draw the tape from the package and insert it into the warp shed of the loom, a rotatable chuck for supporting the weft tape supply package; a variable speed motor having a shaft coupled to said chuck for rotation thereof; a weft tape storage device located between the supply package and the weft tape insertion means; an aspirator for drawing the weft tape tangentially from the package and feeding the weft tape into the weft tape storage device the improvement comprising: means for sensing the diameter of the weft tape supply package and providing a signal according thereto; control means coupled to said variable speed motor and actuated by said signal for increasing or decreasing the speed of the motor according to the magnitude of said signal; a clutch means connected between said rotatable chuck and said motor and coupled to said loom for connecting said chuck with said motor only during operation of the loom; and a flywheel on said motor shaft between said motor and said clutch for increasing the moment of inertia of the motor and reducing speed fluctuations.

2. The apparatus of claim **1**, said weft tape storage device being a tube open at both ends, said weft tape being fed into and withdrawn from the same end of the tube.

3. The apparatus of claim **1**, wherein the weft tape storage device comprises an elongated E-shaped trough, said trough being formed by two outer walls a partition wall and a bottom and being adapted to contain a loop of weft tape, the loop being fed by the aspirator into one end of the trough, passing along one side of the trough, looping around one end of the partition wall, and being drawn by the weft insertion means from the trough part way along the other side thereof, the end of the partition wall being shaped such that it lifts the loop out of the trough each time the loop becomes shorter than the partition wall.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,918,501

DATED : November 11, 1975

INVENTOR(S) : Michael John Wolstencroft

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, lines 12-13 (second instance), delete "for the motor in the same manner as described above";

line 58, insert a percent sign (%) after "$\pm 1\frac{1}{2}$".

Signed and Sealed this

twenty-seventh Day of *April 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks