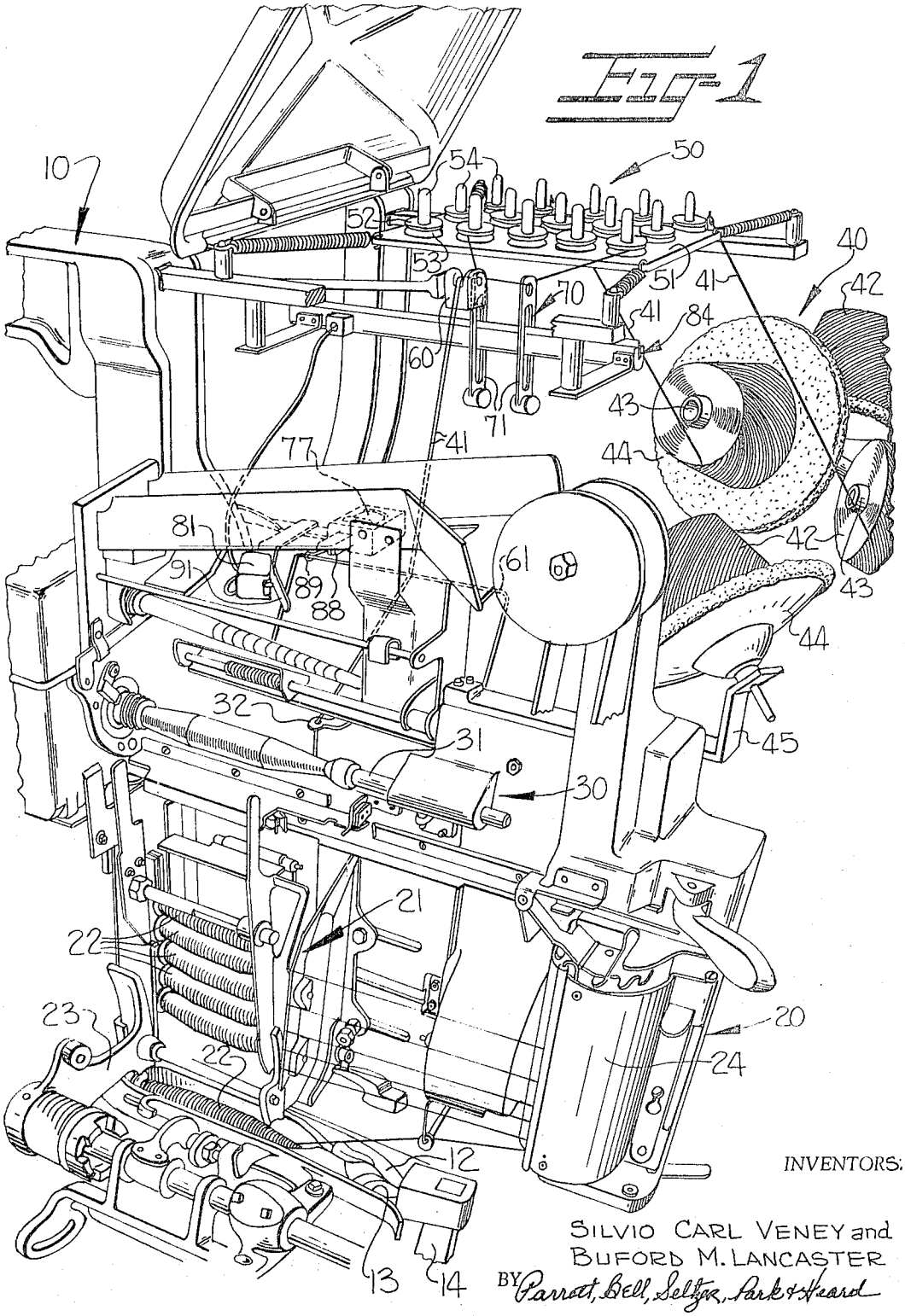
Dec. 13, 1966 S. C. VENEY ETAL 3,291,160

METHOD AND APPARATUS FOR WEAVING NOVELTY FABRIC

Filed Dec. 29, 1964 4 Sheets-Sheet 1

Fig. 1



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METHOD AND APPARATUS FOR WEAVING NOVELTY FABRIC

Filed Dec. 29, 1964 4 Sheets-Sheet 2

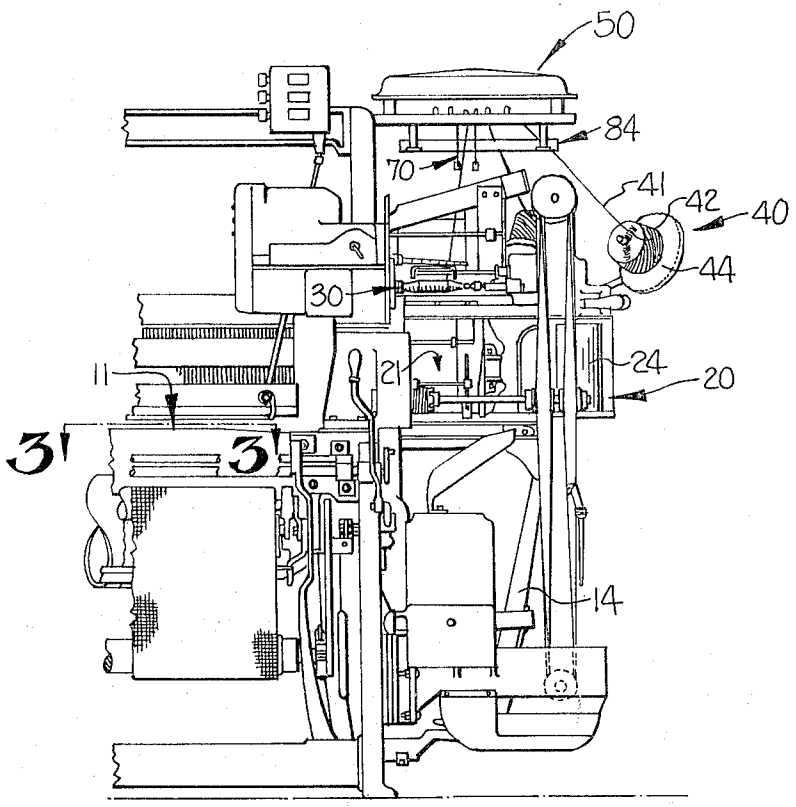


Fig-2

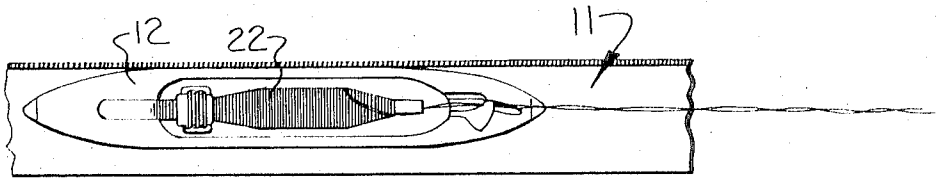


Fig-3

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METHOD AND APPARATUS FOR WEAVING NOVELTY FABRIC

Filed Dec. 29, 1964 4 Sheets-Sheet 3

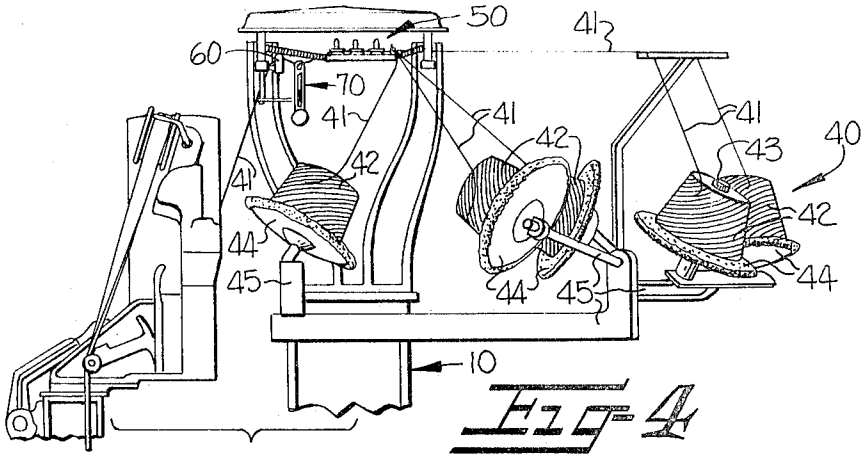


Fig-4

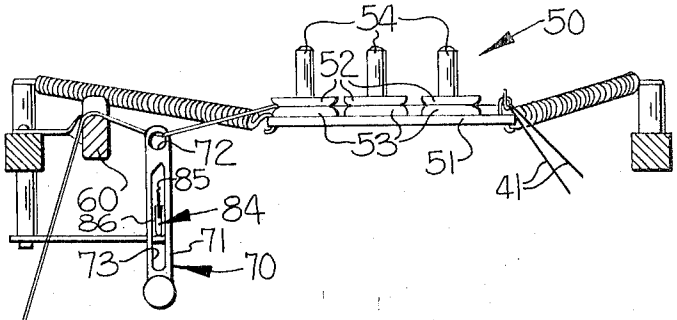
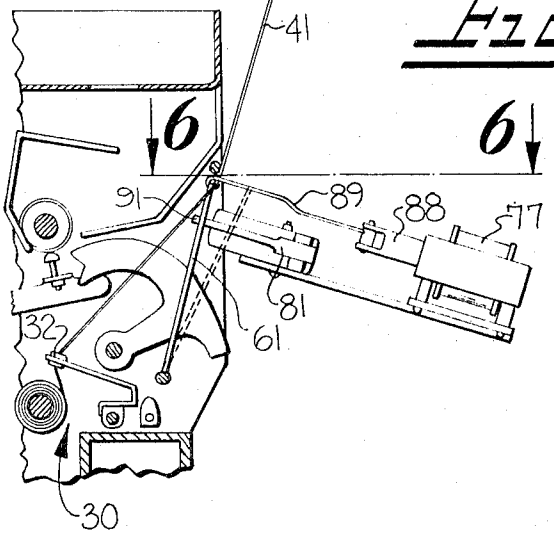


Fig-5



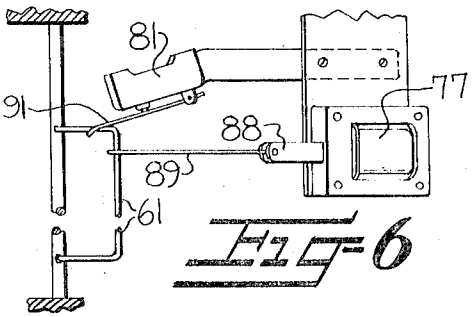


Fig-6

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METHOD AND APPARATUS FOR WEAVING NOVELTY FABRIC

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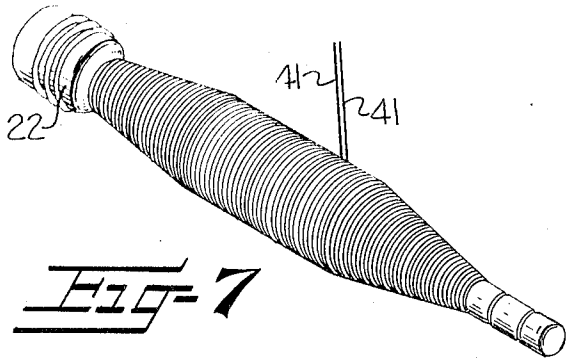


Fig-7

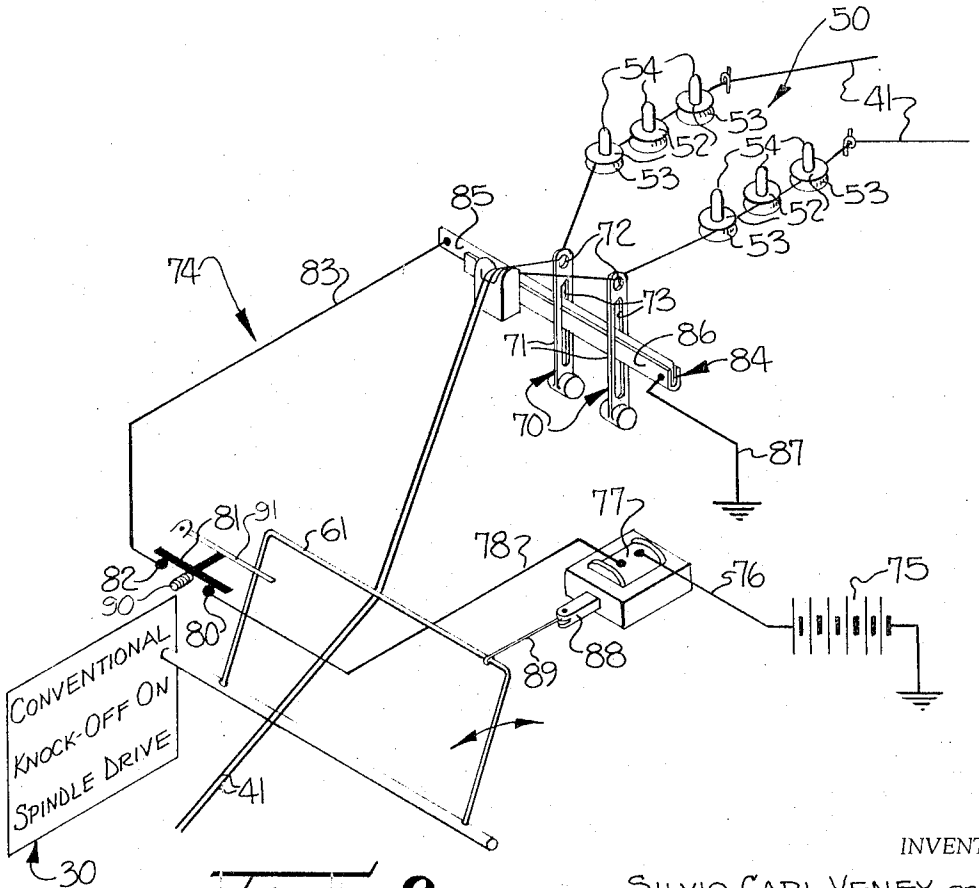


Fig-8

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United States Patent Office 3,291,160 Patented Dec. 13, 1966

3,291,160
METHOD AND APPARATUS FOR WEAVING NOVELTY FABRIC

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5 Claims. (Cl. 139—224)

This invention relates to a method and apparatus for weaving novelty fabric and more particularly to a method and apparatus for weaving novelty fabric having a plurality of filling yarns uniformly twisted together in each pick of the fabric.

In weaving this type of novelty fabric, it is desirable to have these filling yarns uniformly twisted together in each pick to provide a uniform effect and appearance in the fabric. It has been found that the preferred method of providing uniformity in the twist of the filling yarns is by winding the plurality of filling yarns in parallel relationship on a bobbin and then axially withdrawing the filling yarns from the bobbin during the insertion of each pick in the weaving operation. This axial withdrawing of the parallel disposed filling yarns will impart a uniform twist to the yarns to produce the desired effects and appearances in the novelty fabric.

Presently available winding and weaving methods and apparatuses do not lend themselves to obtaining uniformity in the novelty fabrics made in accordance with the above described method. It is presently the practice in textile operations to perform most of the filling bobbin winding away from the loom on winding machines having a plurality of winding stations separate from the loom and then manually transport the wound bobbins to the loom for manual or automatic insertion into the shuttle of the loom. When utilizing this procedure to wind a plurality of filling yarns on a single bobbin, non-uniformity will result in the winding operation from winding machine to winding machine and even from winding station to winding station on the same machine due to unavoidable variances in the operation of the different mechanisms, such as feeding, tensioning, winding, etc. This non-uniformity in the winding operation will cause non-uniformity in the twist produced in the filling yarns inserted during weaving in each pick and thereby destroy the desired uniformity in the novelty fabric.

Also, during the subsequent manual handling of the filling bobbins in transporting them from the winding machines to the looms, the parallel arrangement of the filling yarns on the bobbins will be disturbed or disarranged which will destroy the uniformity in the novelty fabric.

A further and perhaps more important disadvantage of these prior winding and weaving operations is that during the manual handling of the wound bobbins in supplying them to the loom, one or more of the individual filling yarns may become partially unwound from the bobbin causing some of the yarns to lead other of the yarns during weaving. This leading of one or more of the filling yarns with respect to other of the filling yarns will cause breakage of the filling yarns and non-uniformity in the twist obtained.

A mechanism, such as described in U.S. Patent No. 2,638,936, issued May 19, 1953, is available for winding

filling bobbins at the loom. However, this mechanism does not lend itself to the winding of a plurality of filling yarns on a single bobbin because of the difficulties in maintaining tensions, preventing end breakage, obtaining parallelization of yarns, and the like. This mechanism is intended to wind a single filling yarn on bobbins and does not include the required apparatus for separately handling, tensioning, winding, etc. a plurality of filling yarns in parallel relationship on bobbins.

These and other difficulties and limitations in presently available apparatuses and methods have made it virtually impossible or very hard to produce a novelty fabric having a plurality of filling yarns uniformly twisted together in each pick of the fabric.

It is therefore the object of this invention to provide a method of weaving novelty fabric having a plurality of filling yarns uniformly twisted together in the fabric to provide the desired effects and appearances in the novelty fabric.

It has been found that this object may be accomplished by providing a method of weaving novelty fabrics including the steps of winding a plurality of filling yarns in parallel relationship on bobbins by a single apparatus attached to the loom to provide uniformity in the winding operation, automatically supplying the wound bobbins to the shuttle of the loom to eliminate manual handling of the wound bobbins and to preserve the uniformity obtained in the winding step, weaving the novelty fabric on the loom by inserting the plurality of filling yarns contained on each bobbin into each pick of the novelty fabric, and imparting a uniform twist to the filling yarns during weaving by axially withdrawing the filling yarns from the bobbin during each pick so that the desired effects will be uniformly produced in the novelty fabric.

It is a further object of this invention to provide apparatus for weaving novelty fabric having a plurality of filling yarns uniformly twisted together to uniformly produce the desired effects and appearances in the woven novelty fabric.

It has been found that this object may be accomplished by providing apparatus for weaving novelty fabric of the type set forth above having means for supplying a plurality of filling yarns, a single means attached to the loom for winding the filling yarns in parallel relationship on the bobbins to produce uniformity in the winding operation, and means for automatically supplying the wound bobbins to the shuttle of the loom to eliminate manual handling of the wound bobbins and preserve the uniformity in the parallel arrangement of the filling yarns on the bobbins.

This object may be further accomplished by providing apparatus, as set forth above, including means attached to the loom for separately and individually tensioning each filling yarn between the supply means and the winding means to maintain the filling yarns separated to ensure the parallel relationship of the filling yarns after winding and including individual stop motion means for each of the filling yarns operatively associated with the winding means to stop operation thereof when any of the filling yarns break between the filling yarn supply means and the winding means.

Some of the objects of this invention having been stated, other objects will appear as the description proceeds when

taken in conjunction with the accompanying drawings, in which—

FIGURE 1 is a perspective view of the apparatus for winding a plurality of filling yarns in parallel relationship on bobbins at the loom;

FIGURE 2 is a front elevational view of a portion of an automatic loom having the apparatus of FIGURE 1 attached thereto;

FIGURE 3 is a top plan view of a section of the lay of the loom taken substantially along the line 3—3 of FIGURE 2 and illustrating the filling yarns being withdrawn axially from the bobbin to impart a uniform twist thereto.

FIGURE 4 is a partial side elevational view of the top portion of the apparatus of FIGURE 1 illustrating the mountings of the supply means for the plurality of filling yarns to be wound on the bobbins;

FIGURE 5 is a partial side elevational view with parts removed of the apparatus of FIGURE 1 illustrating the tensioning means and the stop motion means for the fiilling yarns;

FIGURE 6 is at top plan view of a portion of the stop motion means taken substantially along the line 6—6 of FIGURE 5;

FIGURE 7 is a perspective view of a filling bobbin wound with a plurality of filling yarns in parallel relationship; and

FIGURE 8 is a diagrammatic view of the stop motion means and electrical circuit therefor.

Referring now to the drawings, in FIGURES 1 and 2 there is illustrated a portion of an automatic loom, generally indicated by the reference numeral **10**, showing the reciprocating lay mechanism **11**, shuttle **12** received in box **13** at the end of the lay, the picker stick **14** for driving the shuttle from this end of the loom, and the various other instrumentalities generally employed in automatic looms. This loom operates to weave fabric in a manner well understood by those with ordinary skill in the art and will not be explained in detail herein.

The automatic loom **10** further includes a conventional bobbin changing magazine mechanism, generally indicated by the reference numeral **20**. This bobbin changing magazine mechanism **20** is mounted on the loom **10** and includes a magazine **21** for holding wound bobbins **22** prior to insertion in the shuttle **12** of the loom **10**, a transfer hammer mechanism **23** for replacing the empty bobbin in the shuttle with a filled bobbin from the magazine, and a rotating drum type end holder **24** for holding the ends of the filling yarns while the wound bobbins are disposed in the magazine. This mechanism also operates in a manner well understood by those with ordinary skill in the art and its component parts and operation will not be described in detail herein.

The automatic loom **10** further includes a bobbin winding mechanism, generally indicated by the reference numeral **30**. This bobbin winding mechanism is the type disclosed in U.S. Patent No. 2,368,936, issued May 19, 1953 and reference may be had to that patent for a description of the component parts and operation of this mechanism. This device includes a means **31** for holding an empty bobbin and rotating same for winding the filling yarns thereon, a traversing mechanism **32** for traversely winding the filling yarns on the bobbin, and other mechanisms as more fully described in the above mentioned U.S. patent.

The above described automatic loom **10**, automatic bobbin changing magazine mechanism **20** and automatic bobbin winding mechanism **30** are conventional mechanisms utilized in many loom operations.

According to this invention, it is desired to produce a novelty fabric having a plurality of filling yarns uniformly twisted together in the fabric to produce the desired effects and appearances uniformly in the novelty fabric. In order to accomplish this, it has been found that if a plurality of filling yarns are wound in parallel

relationship on a single bobbin by a single apparatus attached to the loom and automatically supplied to the shuttle of the loom without manual handling that upon axial withdrawal of the filling yarns from the bobbin during weaving a uniform twist will be imparted to the filling yarns in each pick of the fabric to provide these desired results.

In order to utilize the above described conventional apparatus for performing the method of this invention, supply means, generally indicated by the reference numeral **40**, for supplying a plurality of filling yarns **41** must be provided. Thus supply means **40** includes a plurality of conical packages **42** of filling yarn **41** supported on separate spindles **43** mounted on and projecting above separate shelves **44** which are supported on brackets **45** attached to any stationary portion of the loom or winding mechanism.

It is also necessary to provide a tensioning means, generally indicated by the reference numeral **50**, for separately handling and individually tensioning each of the filling yarns **41** as they are led from the supply means **40** to the winding mechanism **30**. This separate handling and individual tensioning of the filling yarns **41** is essential to obtain the desired parallel relationship in the winding operation and to prevent the filling yarns from becoming twisted together or otherwise. The tensioning means **50** comprises a shelf or support **51** mounted on the stationary frame portion of the loom or any stationary frame portion of any of the mechanisms. The plate **51** supports a plurality of cooperating discs **52** and **53** rotatable about vertical spindles **54**. These cooperating discs **52** and **53** are disposed in individual rows for receiving and tensioning a separate filling yarn in each row between the cooperating discs. The number of rows of cooperating discs is dependent upon the maximum number of filling yarns to be wound on a single bobbin.

As may be seen in FIGURES 1 and 8, the individual filling yarns **41** are led separately from the supply cones **42** to the individual rows of cooperating discs **52** and **53** in the tensioning means **50** and are maintained separate to prevent intermingling or twisting together of the various yarns. From the tensioning means **50**, the yarns are led to a U-shaped guide member **60** where they are maintained in parallel relationship due to the individual tensioning of the tensioning means. From the U-shaped guide member **60**, the filling yarns **41** are led in parallel relationship to the traversing mechanism **32** to be wound in the winding mechanism **30** in parallel relationship on a bobbin **22**.

Between the U-shaped guide **60** and the traversing mechanism **32**, the filling yarns **41** pass under a stop motion control bar **61**, which is part of the conventional winding mechanism **30** disclosed in the above mentioned U.S. patent. This stop motion control bar **61** is mechanically connected to the drive mechanism of the winding apparatus **30** and is adapted to stop operation of the winding apparatus **30** when the filling yarn passing thereunder breaks and allows the bar **61** to move to a rearward position. This operation is more fully described in the above mentioned U.S. patent and reference may be had to that patent for the complete operation thereof.

Inasmuch as the above discussed stop motion control bar **61** was intended for use with only a single filling yarn, it will not function to stop operation of the winding mechanism **30** when a plurality of filling yarns **41** are passing thereunder and only one or less than all of the filling yarns break. Therefore, individual stop motion means, generally indicated by the reference numeral **70**, for each of the filling yarns must be utilized.

The stop motion means **70** comprises a plurality of electrically conductive drop wires **71** each having an aperture **72** for the passage of an individual filling yarn **41** therethrough and an elongate slot **73** therein. The stop motion means **70** further includes an electrical circuit, gen-

erally indicated by the reference numeral 74, including any convenient source of power 75, a line 76 leading from the power source 75 to a solenoid 77, a line 78 leading from solenoid 77 to a contact 80 of a switch 81, a contact 82 on the other side of the switch 81, a line 83 leading from the contact 82 to one side of an electrode contact bar 84 passing through the slot 73 in the drop wires 71 and comprising electrically conductive plates 85 and 86 insulated from each other to break the circuit, a line 87 leading from the other end of the contact bar 84 to ground. The solenoid 77 includes a piston member 88 and a hook member 89 attached to the piston member 88. The hook member 89 engages the stop motion control bar 61 to move the bar 61 to a rearward position when the solenoid 77 is actuated to retract the piston 88 upon completion of the circuit 74. This rearward motion of the stop motion control bar 61 will stop operation of the winding means 30.

The drop wires 71 are normally held in a raised position, as shown in FIGURE 8, out of contact with the plate 85 of the contact bar 84 when the filling yarn 41 is unbroken and passing therethrough to maintain the circuit 74 open. However, if any of the filling yarns 41 break, the corresponding drop wire 71 will drop into engagement with the plate 85 thus completing the circuit through the contact bar 85 and actuating the solenoid 77 to withdraw the stop motion control bar 61 to stop operation of the winding apparatus 30.

The switch 81 in circuit 74 is a safety switch which is biased to an open position by spring member 90. The switch 81 includes an arm 91 in contact with the stop motion control bar 61 which normally holds the switch 81 closed against the bias of spring member 90 during the normal running of the filling yarns thereunder. However, upon the breakage of a filling yarn causing actuation of the solenoid 77 and rearward movement of the stop motion bar 61, the stop motion bar 61 will disengage the arm 91 to allow the spring member 90 to open the switch 81 following the stopping of the operation of the winding means. This opening of the switch 81 will open the circuit 74 and prevent sparking between the drop wires 71 and the contact bar 84.

Thus it may be seen that individual stop motion means for each of the filling yarns is provided which will stop operation of the winding means when any of the filling yarns break to allow an operator to rethread the tensioning and winding means.

From the above description it may be seen that a method and apparatus is provided for weaving novelty fabric having a plurality of filling yarns uniformly twisted together in each pick of the fabric to produce the desired affects and appearances uniformly in the novelty fabric. This invention makes it possible to use conventional bobbin winding equipment attached to the loom and a conventional automatic bobbin changing loom for performing the method of this invention.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes in limitation, the scope of the invention being defined in the claims.

What is claimed is:

1. Apparatus in combination with a loom for facilitating the weaving of a novelty fabric having intertwisted filling yarns and wherein the twist in the filling yarns is more uniform throughout the fabric, said loom including a shuttle adapted to receive bobbins of filling yarn, a plurality of relatively large packages of filling yarn carried by the loom for supplying yarn to said filling bobbins, a filling bobbin winder also carried by the loom, separate means for individually tensioning a plurality of said filling yarns in their path of travel from said relatively large packages to said winder, common means to present the yarns in parallel side-by-side relation to the winder, said winder upon being actuated winding said filling yarns in parallel side-by-side relation onto successive filling bobbins, and means for automatically supplying the wound filling bobbins from said winder to said shuttle so that movement of said shuttle across the loom during weaving causes withdrawal of the filling yarns axially from the bobbin therein to intertwist the filling yarns.

2. Apparatus in accordance with claim 1 including individual stop motion means for each of the filling yarns operatively associated with said winder to stop operation thereof when any of the filling yarns break between said filling yarn supply packages and said winder.

3. Apparatus in accordance with claim 1 in which said means for tensioning said filling yarns comprises individual rows of cooperating discs for receiving and tensioning a separate filling yarn in each row between said cooperating discs.

4. In a textile loom having means for winding filling bobbins and supplying them to the shuttle of the loom; the combination of means for supplying a plurality of filling yarns to be wound on each bobbin, means for separately and individually tensioning each filling yarn between said supply means and said winding means to maintain the filling yarns separated so that they are wound uniformly in parallel relationship on the bobbins by said winding means, indidivual stop motion means for each of the filling yarns operatively associated with said winding means to stop operation thereof when any of the filling yarns break between said filling yarn supply means and said winding means, said stop motion means comprises a plurality of electrically conductive drop wires each having an aperture therein for the passage of an individual filling yarn therethrough and an elongate slot therein, and an electrical circuit operatively connected with said winding means and adapted to stop operation thereof when completed, said circuit including an electrode contact bar passing through said slots in said drop wires comprised of two electrically conductive plates insulated from each other to break said circuit, said drop wires being held in a raised position out of contact with one of said plates when the filling yarn passing therethrough is unbroken and being adapted to drop to a lowered position in contact with both of said plates to complete said circuit through said contact bar to stop operation of said winding means when the filling yarn is broken and does not pass therethrough and a safety switch which is normally closed to complete said circuit therethrough and which is opened to open said circuit following the stopping of the operation of said winding means to prevent sparking between said drop wires and said contact bar.

5. In a textile loom having means for winding filling bobbins and supplying them to the shuttle of the loom; the combination of means for supplying a plurality of filling yarns to be wound on each bobbin, means for separately and individually tensioning each filling yarn between said supply means and said winding means to maintain the filling yarns separated so that they are wound uniformly in parallel relationship on the bobbins by said winding means, said tensioning means comprising individual rows of cooperating discs for receiving and tensioning a separate filling yarn in each row between said cooperating discs, individual stop motion means for each of the filling yarns operatively associated with said winding means to stop operation thereof when any of the filling yarns break between said filling yarn supply means and said winding means, said stop motion means comprising a plurality of electrically conductive drop wires each having an aperture therein for the passage of an individual filling yarn therethrough and an elongate slot therein, and an electrical circuit operatively connected with said winding means and adapted to stop operation thereof when completed, said circuit including an electrode contact bar passing through said slots in said drop wires comprised of two electrically conductive plates insulated from each other to break said circuit, said drop wires being held in

a raised position out of contact with one of said plates when the filling yarn passing therethrough is unbroken and being adapted to drop to a lowered position in contact with both of said plates to complete said circuit through said contact bar to stop operation of said winding means when the filling yarn is broken and does not pass therethrough and a safety switch which is normally closed to complete said circuit therethrough and which is opened to open said circuit following the stopping of the operation of said winding means to prevent sparking between said drop wires and said contact bar.

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