Feb. 2, 1960 J. W. BUSH ET AL 2,923,120

FANCY YARN MANUFACTURE

Filed July 24, 1957 2 Sheets-Sheet 1

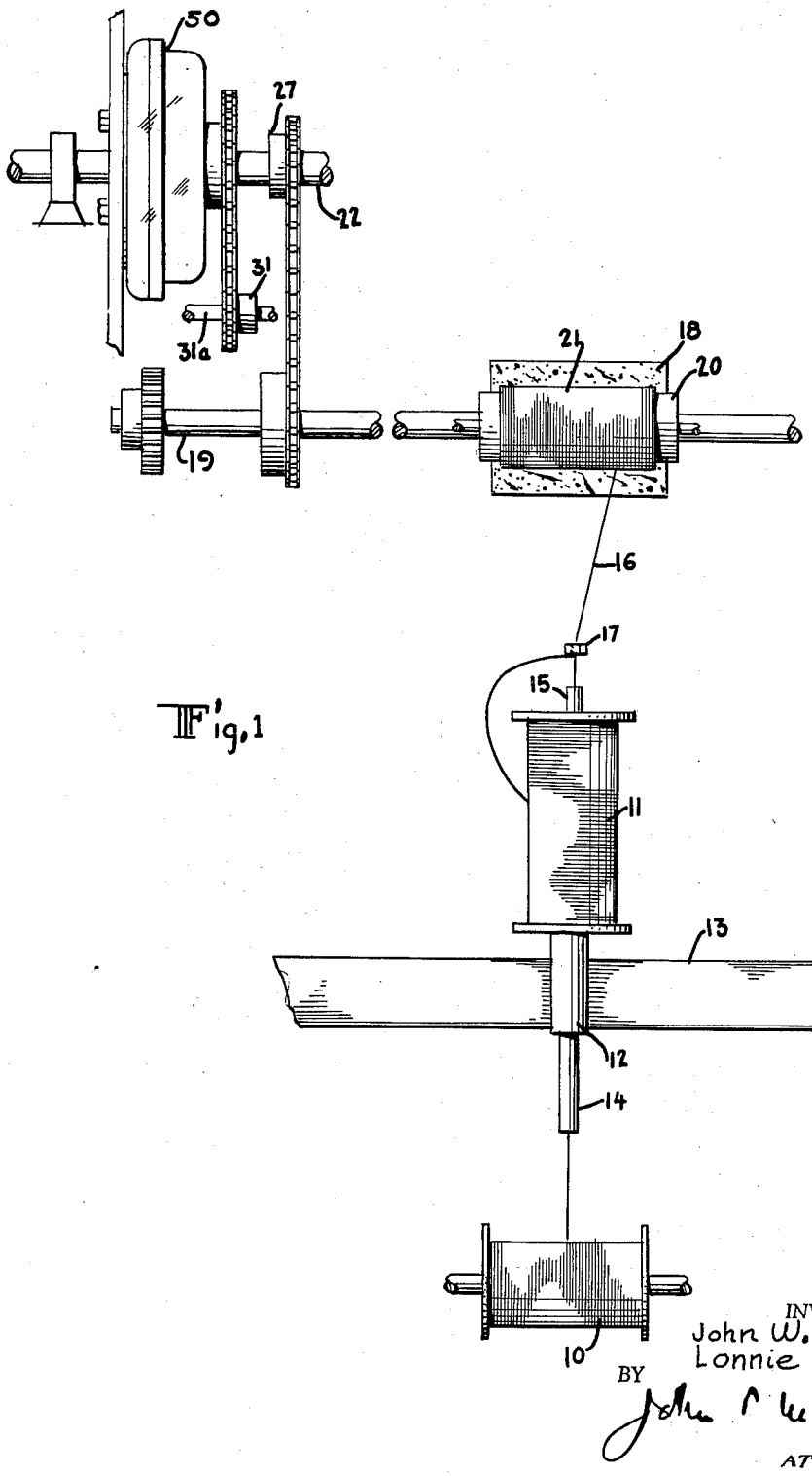


Fig. 1

INVENTORS
John W. Bush
Lonnie Long

BY

ATTORNEY

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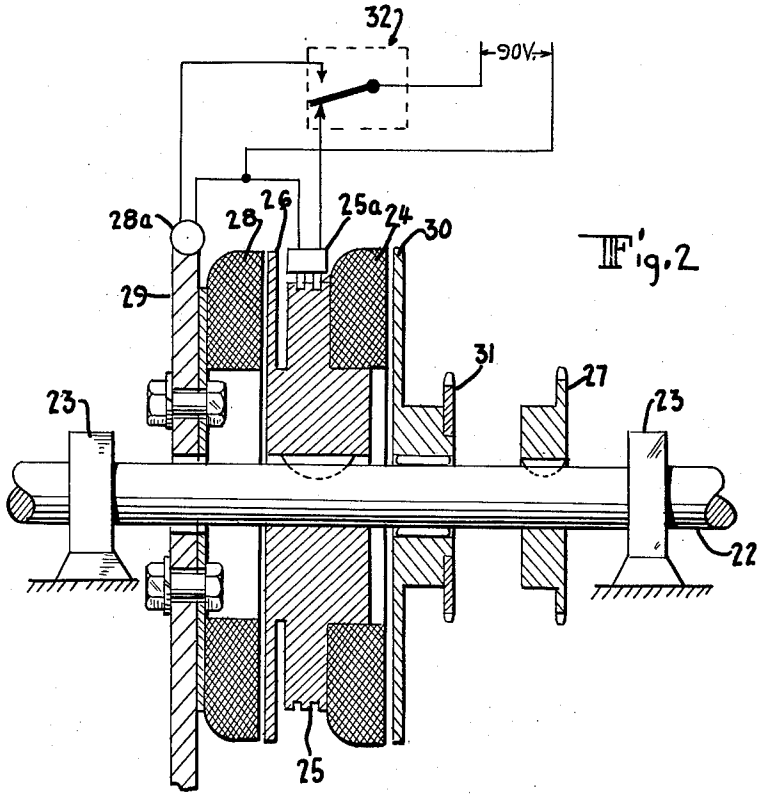


Fig. 2

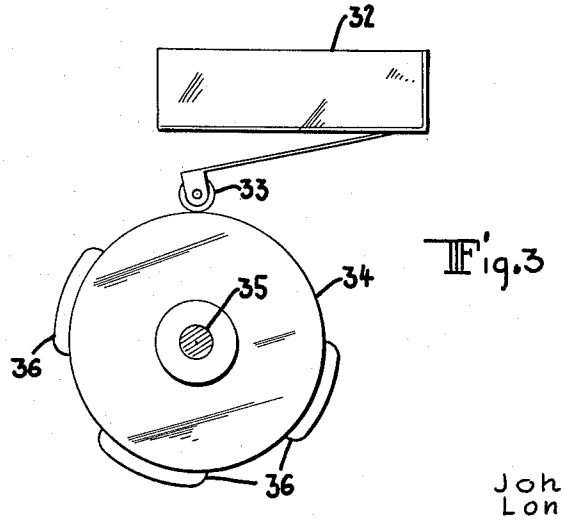


Fig. 3

INVENTORS
John W. Bush
Lonnie Long

BY

ATTORNEY

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FANCY YARN MANUFACTURE

John W. Bush and Lonnie Long, Clarkesville, Ga., assignors to United Merchants and Manufacturers, Inc., New York, N.Y., a corporation of Delaware

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4 Claims. (Cl. 57—18)

This invention relates to the manufacture of yarns, and more particularly to special effects and fancy yarns obtained in twisting operations or the like.

Prior to the weaving or knitting of cloth piece goods of any kind or description, the yarn components thereof must first be fabricated. Such fabrication normally involves a whole chain or sequence of operations beginning with opening and picking, carding and combing, the drawing and roving operations, spinning, winding and twisting, and finally spooling, warping and slashing. After all these steps of what might be roughly termed fiber preparation, there follows the weaving or knit goods manufacture, bleaching, dyeing or printing, and finally fabric finishing, after which the material thus fabricated may be stored or shipped out for final disposition.

Twisting is a part and parcel of the yarn preparation referred to above. In the twisting process two or more single yarns are spiralled about each other, thereby forming in combination a plied or ply yarn. Any number of yarns may be used in twisting, and moreover, the twist may be applied in either direction. This plying of yarns in the twisting operation may, and frequently does, result in varied effects, such as increased strength, enhanced smoothness or appearance, and/or novelty, and/or fancy effects.

On special twisters it is possible to feed different yarns at different rates, or intermittently, and it is further feasible to combine these two features and thereby produce special novelty effects.

The present invention proposes a method and means for making special novelty effects in yarns by twisting together two or more yarns to form a composite ply yarn.

A further purpose and object of the invention is a method and means for making special or novelty effects in composite novelty core yarns. The term "core yarn" as used herein comprises one or more yarns either of spun yarn or continuous filament nature which in the twisting operation are drawn through a hollow spindle from a cradle below said spindle (as will appear hereinafter). In the production of novelty yarns, with which the present invention is concerned, usually such novelty yarns have both a core yarn and an effect yarn or thread. The relation between these two yarn elements is such that the effect thread is wound around or spiralled about the core yarn so that the two components, in combination, form a composite novelty yarn composed of a core yarn or thread and an effect yarn or thread wound thereabout. However, the combination of the effect and core components in such composite novelty core yarns is not one of permanent adherence, so that the core and effect yarns retain their individually distinct identity and are not fused together into a single entity or unit. The effect member also may be of continuous filament character, or may be made entirely of spun yarn. Both the core and the effect components may be of the same or differing fiber content. Either

or both may be in whole or in part of wool, cotton, linen, rayon, acetate, nylon, Vinyon, Dacron, Orlon, or any other natural or synthetic or man-made type fiber, and in continuous filament form or in the form of spun yarn.

The invention further contemplates the production of composite novelty core yarns by a method and means including the twisting or plying or wrapping together of two or more yarns to form a composite plied yarn. To these and other ends the effect component of said plied yarn is preferably continuously twisted as it is wound spirally about or around the core member. The core yarn component does not receive any twist as the effect component is wound thereabout. As the twisting and winding of the effect thread proceeds there occurs simultaneously an intermittent and regularly recurrent interruption of the take-up of the composite plied yarn. As a result there is a build-up of twist in the effect yarn during the period while the take-up of the composite plied yarn is stopped or interrupted. The core remains twistless. This effects a seed or slub type yarn. A slub yarn is one in which soft and relatively thick tufts of fiber are incorporated at regular intervals along the length or lengthwise of said yarn. A seed yarn, also called Knop yarn, is a ply novelty yarn with pronounced knots or buttons of yarn appearing at intervals. It consists of one or more ground threads delivered slowly at intermittent speed and an effect thread—usually of different color and/or material—delivered faster and continuously. Thus, the latter accumulates in thick bunches or knops. It is also called knotted or nub yarn.

The present invention further has for its purposes and objects the manufacture or fabrication of unlimited fancy effects on almost any type yarns, as will hereinafter appear.

With the above and other objects in view, as will be apparent, the present invention consists in the construction, combination, and arrangement of parts and/or steps, all as hereinafter more fully described, claimed, and illustrated in the accompanying drawings wherein:

Fig. 1 is a schematic side view of those parts and portions of the twisting operation and apparatus considered necessary or advisable for understanding the nature and scope of the present invention, which view illustrates the fabrication of a core yarn by means for continuously twisting and spiralling a wrapper or effect yarn about a twistless core to form a composite plied novelty yarn, and means for interrupting at predetermined and regularly recurring intervals the take-up of said plied composite novelty yarn without stopping the application of continuous twist to the wrapper or effect component of said novelty yarn;

Fig. 2 is a side view, partly in section, of an electrically actuated clutch brake assembly comprising means for intermittent and regularly recurring interruption of the rotation of a central shaft member controlling take-up of the composite novelty yarn, and includes a diagrammatic representation of a double throw, single position switch for alternately effecting rotation of the central shaft and bringing it to rest, motionless; and

Fig. 3 is a schematic representation or illustration of a motor driven cam assembly for actuation of the electrically operated clutch brake assembly of Fig. 2 according to the present invention.

The up-twister assembly illustrated in Fig. 1 of the drawings hereof is constructed and arranged for the manufacture of fancy effects in composite novelty yarns according to one embodiment of the invention. As therein shown, said twister apparatus preferably comprises a supply of yarn without limitation as to its type, finish, or other properties and characteristics for the core component of the composite novelty yarn which

may be in the form of a yarn package **10** mounted for rotation about its longitudinal axis in any suitable bracket or holder (not shown). It will be understood, of course, that more more than one yarn may be fed to the up-twister for processing. For such purposes two or more yarn cradles or holders **10** may be employed for simultaneous unwinding and feeding into the up-twister frame.

The effect component of the present yarn may be supplied to the twisting assembly as by means of the vertically mounted yarn package **11** which is fitted on over a hollowed-out tapering sleeve or spindle blade **12**. Rotation of the vertically arranged effect yarn package **11** is effected by means of the high speed horizontally traveling belt **13** in contact with the wider and lower end portion of spindle blade **12**.

As the core yarn member is unwound from the package **10**, it travels upwardly through a tube **14** depending from the spindle **12**, and thence through the hollow interior passageway of the blade **12** until it emerges from the relatively constricted neck portion **15** of the spindle blade **12**. At or near that point the untwisted core component **10** makes contact with the twisted effect yarn **11**, both the untwisted core **10** and twisted wrapper **11** being there plied together to form a single or unitary composite novelty yarn **16** at or near the balloon guide station **17**. The function of the moving belt **13** is to rotate the package **11** containing the effect component, whereby said effect yarn is unwound from the vertically mounted yarn package **11**. Twist continues to be inserted in the effect yarn **11** because of the fact that the spindle **12** continues to rotate without interruption even as movement of the composite core novelty yarn **16** stops when the cork roll **18** stops.

Means are also provided herein for simultaneously unwinding both the core member **10** and effect component **11** from their respective packages so that they may be brought together at or near the guide station **17** to form, as stated, the combination or composite novelty yarn **16**. Such unwinding means, as seen in Fig. 1, includes the cork roll **18** which is fixed to rotate with the cork roll shaft **19**. The exterior surface of the cork roll **18** contacts the composite novelty yarn **16**, and the cork roll shaft **19** is driven by any suitable means, as for example, the clutch-brake electrically actuated mechanism **50** hereinafter described. As the composite novelty yarn **16** travels through the guide zone **17**, it is taken up in the form of a package **21** on an aluminum tube **20** which is driven by frictional contact with the cork roll **18**, which latter rotates in unison with the cork roll shaft **19**.

Normally, the amount of twist or number of turns per inch inserted in a yarn in the conventional up-twister operation is regulated by the ratio of speed between the wrapper or effect thread bobbin **11** and speed of rotation of the cork roll **18** on which the twisted yarn is taken up at the end of the twisting operation. This ordinarily is a continuous and uniform motion, for the spindle **11** runs continuously at a constant and predetermined r.p.m., while the cork roll **18** does likewise. There is no change in either of these two speeds, that is—the speed of rotation of the bobbin **11** and the speed of rotation of the cork roll **18**, unless the pulleys or gears which drive these respective members are changed so as to alter or modify the degree of twist or over-all speed of the twister frame.

Furthermore, according to conventional twisting procedure, the spindle **12** is solid, not hollow, and no passageway therethrough is provided for the core yarn **10**; therefore, in the present invention an extra supply, package **10**, comprising a core element for the composite or combination yarn **16** is mounted below the hollow spindle **12** and its dependent connecting tube **14**.

Moreover, the instant invention also includes variable means for intermittently starting and stopping rotation of the cork roll shaft **19** controlling rotation of the cork roll **18** and take-up package **21**, as will be described presently. As a result of these modifications in conventional twister apparatus and twisting procedure, virtually unlimited fancy may be obtained on almost any type of yarn. The action involved is that the twisted yarn spindle **12** rotates continuously, while the package containing the core yarn **10** being drawn through the tube **14** and hollow spindle blade **12** starts and stops according to a predetermined timing sequence. The thread or core yarn **10** going through the hollow spindle **12** does not receive any twist, so that it is either twistless or carries only that amount of twist which is had received in prior operations before being wound up on the supply package **10**. In contrast, the effect yarn is twisted to any desired extent as it unwinds from the spindle package **11** by means of conventional change gears which alter the ratio of r.p.m. between spindle **12** and cork take-up roll **18**. The take-up package **21** alternately stops and goes. As the composite novelty yarn **16** is intermittently wound up thereon, there results a build-up of extra twist on the effect yarn component **11** during the time while the cork roll **18** and take-up package **21** of twisted composite novelty yarn **16** are at rest and not in motion. Thus, a seed or slub type effect on the composite yarn **16** is obtained. The number and kind of different yarn combinations and effects which may be secured by altering or modifying the pattern of rotation of the cork roll **18** controlled by rotation of the cork roll shaft **19** is virtually unlimited. Also, as previously mentioned, two or more threads or yarns **10** may be simultaneously fed up through the hollow spindle **12** and tube end **14**.

Further according to the present invention, an electrically controlled brake-clutch mechanism **50** is provided for allowing rotation of the take-up roll or tube **20** to be stopped at regular predetermined intervals. The electric clutch-brake assembly illustrated in Fig. 2 has been found suitable for such purposes. This mechanism may be mounted on a central shaft **22** which is freely rotatable about its longitudinal axis on spaced ball bearings **23** situated on opposed sides thereof. Keyed to the rotatable shaft **22**, and therefore designed to rotate therewith, are a clutch magnet **24**, the collector rings **25**, a brake armature **26**, and a drive sprocket **27** in spaced relation to the clutch magnet **24**, for controlling rotation of the cork roll shaft **19** and the cork roll **18**, the latter being fixed to said cork roll shaft **19**. The clutch brushes and brush holder **25a** are stationary.

A brake magnet **28** is bolted or otherwise fixed to the stationary frame piece **29** and does not rotate. The clutch-brake mechanism **50** may be of the type manufactured by the Warner Electric Brake Manufacturing Company of Beloit, Wis. under the general title "Warner Electric Brakes and Clutches for Industrial Application." It must be understood, however, that other clutch-brake mechanisms may be employed with equal effect to intermittently start and stop rotation of the cork roll shaft **19** and take-up tube **20**.

The Warner electric brake and clutch consists of two simple electromagnets and two armature discs adapted to coact with said magnets. The brake armature, when used as a brake, rotates with the shaft, pulley, hub, or fly wheel by which it is carried, while the brake magnet remains stationary. When the brake magnet is energized, it attracts the brake armature and creates the braking effect through friction of the brake magnet poles and the brake magnet face lining material, upon the brake armature. As a clutch, both the clutch magnet and the clutch armature rotate with whatever shaft, hub, pulley or part to which they are attached. The clutch magnet receives its current through collector rings and brushes. The clutch and brake armature sections have a wear surface made up of segments of magnetic material that are welded to steel back plate. The magnet section consists of an electro-magnet design faced with molded friction material. Power is applied through a coil solidly em-

bedded below the friction facing material of the magnet section.

A clutch armature **30**, as seen in Fig. 2, is driven from the twister frame **31a** by means of a sprocket **31**, and the sprocket **31** and clutch armature **30** may both be conveniently mounted on roller bearings, and are therefore free to rotate independently of any other parts of the clutch-brake assembly. The speed of rotation of the sprocket **31** and armature **30** is preferably constant, and may be determined or fixed by the gear settings on the twister.

The operation of the clutch-brake device **50** is controlled by a cam-operated, double throw, single pole switch **32**. The switch **32** may be actuated by a cam follower **33** (see Fig. 3) which is constructed and arranged so as to run on the surface and about the periphery of a revolvable cam wheel **34** driven by a shaft **35** rotated by any suitable power source (not shown). A plurality of regularly or irregularly, as desired, spaced cams **36** are temporarily or permanently fixed to the working surface of the motor driven cam wheel **34**. As will be understood, the cam wheel **34** may be rotated at any desired speed, and the several cams **36** can be made of any length and located at any interval along the peripheral surface of cam wheel **34**. If desired, a single cam may be substtiuted instead of the plurality of cams **36**. The number and variety of different cam combinations is virtually unlimited.

In operation, when the cam follower **33** is moving or running along the surface of the cam wheel **34**, as shown in Fig. 3, then the switch **32** energizes the clutch-magnet **24** and the clutch armature **30** together. This action rotates the clutch-brake mounting shaft **22**, which in turn, by reason of the connecting sprocket drive **27** keyed to shaft **22**, revolves the cork roll shaft **19** controlling simultaneous rotation of the cork roll **18** and the take-up package **21**. At the same time the circuit to the brake magnet **28** and brake terminals **28a** is open, and therefore inoperative.

When a cam **36** lifts the cam follower **33** from the working normal surface of the cam wheel **34**, then the switch **32** moves to its second position. This opens the circuit to the clutch-magnet **24** and closes the circuit to the brake magnet **28**. The brake armature **26** is now electrically locked to the brake magnet **28**, the latter being fixed as by bolts to the stationary frame piece **29**. Under these circumstances and conditions, as described, the brake armature **26**, and therefore the central mounting shaft **22** and drive sprocket **27** to which it is keyed cease to rotate. As a result, and simultaneously with such cessation of rotation, the cork roll shaft **19**, the cork roll **18**, and the take-up package **21**, all also stop revolving and come to rest. But the belt **13** which controls twisting of the yarn **11** and rotation of the vertical spindle **12** are independent of movement of either of the shafts **19** and **22**, whereby the spindle **12** continues to rotate and extra twist is built up in the effect yarn element **11** of the composite novelty yarn **16**. The added twist tends to make the twisted wrapper **11** turn back upon itself, and thereby form loops or slubs or other special or fancy yarn effects, as previously explained.

Manifestly, the length of time or periods of rotation of the clutch-brake mounting shaft **22** and the fork roll shaft **19** acting simultaneously therewith, and the periods when there is no rotation thereof, can be varied in many ways, as by suitable modification of the cam arrangement, cam speed, and/or cam lengths.

What is claimed is:

1. The combination in a twister apparatus for the manufacture of novelty yarns, of means for producing slub effects in such yarns, said means comprising unwinding means for simultaneously unwinding individually distinct effect and corn yarn components for such novelty yarns from separate sources of supply, twisting means for continuously applying twist to the effect component as it is unwound while preventing the application of any twist to the core component as it unwinds, plying means for bringing the untwisted core and twisted effect components together into the form of a composite novelty yarn, the effect component being spirally wound about the core component, means for moving the plied composite novelty yarn toward and into a take-up zone, an electrically actuated brake means for periodically interrupting movement of the said plied composite novelty yarn toward the take-up zone, whereby an excess of twist is built up only in the effect component of said composite novelty yarn, and an electrically actuated clutch means for periodic resumption of movement of said plied yarn into the take-up zone, whereby slub effects are formed in said composite novelty yarn at intervals lengthwise thereof.

2. The combination in a twister apparatus for the manufacture of novelty yarns, of means for producing slub effects in such yarns, said means comprising unwinding means for unwinding individually distinct effect and core yarn components for such novelty yarns from a supply thereof, twisting means for continuously applying twist to the effect component as it is unwound while preventing the application of any twist to the core component as it unwinds, plying means for bringing the untwisted core and twisted effect components together into the form of a composite novelty yarn, the effect component being spirally wound about the core component, means for moving the plied composite novelty yarn toward and into a take-up zone, an electrically actuated brake means for periodically interrupting movement of the said plied composite novelty yarn toward the take-up zone, whereby an excess of twist is built up only in the effect component of said composite novelty yarn, and an electrically actuated clutch means for periodic resumption of movement of said plied yarn into the take-up zone, whereby slub effects are formed in said composite novelty yarn at intervals lengthwise thereof.

3. The combination in a twister apparatus for the manufacture of novelty yarns, of means for producing slub effects in such yarns, said means comprising unwinding means for unwinding individually distinct effect and core yarn components for such novelty yarns from a supply thereof, twisting means for continuously applying twist to the effect component as it is unwound while preventing the application of any twist to the core component as it unwinds, plying means for bringing the untwisted core and twisted effect components together into the form of a composite novelty yarn, the effect component being spirally wound about the core component, means for moving the plied composite novelty yarn toward and into a take-up zone, brake means for periodically interrupting movement of the said plied composite novelty yarn toward the take-up zone, whereby an excess of twist is built up only in the effect component of said composite novelty yarn, and clutch means for periodic resumption of movement of said plied yarn into the take-up zone, whereby slub effects are formed in said composite novelty yarn at intervals lengthwise thereof.

4. The combination in a twister apparatus for the manufacture of novelty yarns, of means for producing slub effects in such yarns, said means comprising unwinding means for unwinding individually distinct effect and core yarn components for such novelty yarns from a supply thereof, twisting means for continuously applying twist to the effect component as it is unwound while preventing the application of any twist to the core component as it unwinds, plying means for bringing the untwisted core and twisted effect components together into the form of a composite novelty yarn, the effect component being spirally wound about the core component, means for moving the plied composite novelty yarn toward and into a take-up zone, means for periodically interrupting movement of the said plied composite novelty yarn toward the take-up zone, whereby an excess of twist is built up only in the effect component of said composite novelty

yarn, and means for periodic resumption of movement of said plied yarn into the take-up zone, whereby slub effects are formed in said composite novelty yarn at intervals lengthwise thereof.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,923,120 February 2, 1960

John W. Bush et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 4, after "fancy" insert -- effects --; line 12, for "is had" read -- it had --.

Signed and sealed this 5th day of July 1960.

(SEAL)
Attest:
KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents