

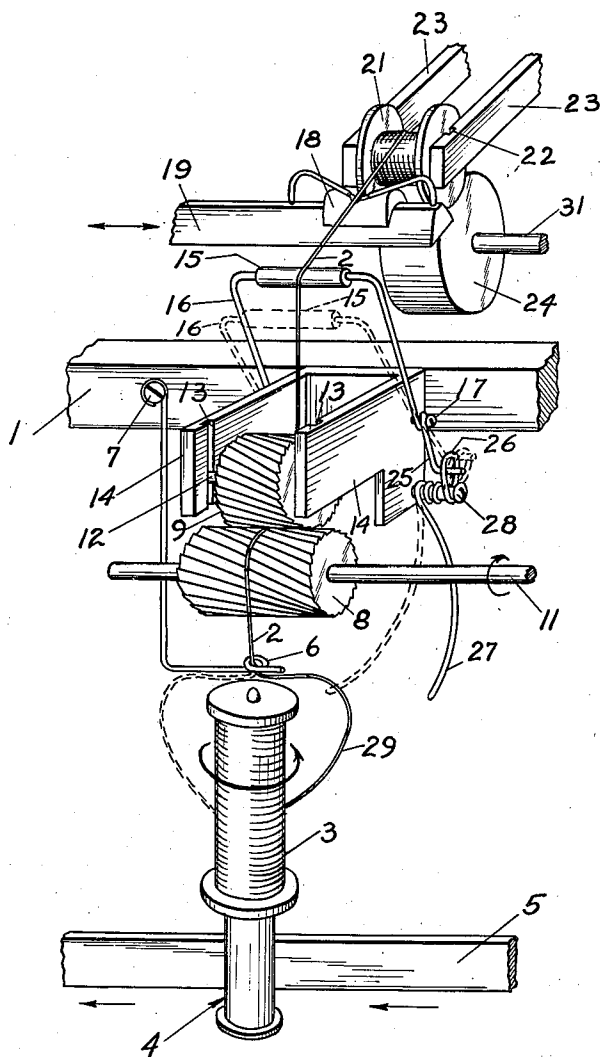
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DEVICE FOR PRODUCING STAPLE FIBER YARNS FROM CONTINUOUS FILAMENTS

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DEVICE FOR PRODUCING STAPLE FIBER
YARNS FROM CONTINUOUS FILAMENTS

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This invention relates to the manufacture of textile yarns, and relates more particularly to a device for producing yarns having the appearance of spun yarn, that is, yarn made from staple fiber, but having a basis of continuous filaments.

In the manufacture of spun yarn from artificial fibers, the usual practice is to cut continuous artificial filaments or waste filaments into comparatively short lengths, for example of 1½ to 2 inches or more, and then subject the staple fibers produced to a series of operations appropriate to the length of the fiber, such operations being similar to those accorded to natural fibers such as cotton or wool, including opening, carding, drawing and spinning. These operations represent considerable expense in the production of such yarns, since they involve a relatively slow transformation of the initial fibrous material to a finished yarn.

It is an object of this invention to provide an improved device for producing yarn having an appearance similar to that of yarn made from spun fiber without the necessity for cutting continuous filaments into short lengths and spinning the fibers thus produced, which device is simple in construction, inexpensive in cost and effective in operation.

A further object of this invention is the provision of means for preventing the fouling of the device and consequent wastage of yarn upon breaking.

Other objects of this invention, together with certain details of construction and combinations of parts, will appear from the following detailed description and the claims.

In accordance with the present invention an up-twisting device has associated therewith a pair of rollers, one or both being fluted, through which a bundle comprising a suitable number of continuous filaments, hereinafter referred to as yarn, is passed. The surfaces of the rollers are adapted to move in the same general direction as the yarn and at a different speed therefrom. The cutting of the filaments in the yarn is effected by the pressure of one of the rollers against the other, the cutting action being carried out so that at any one point only one or relatively few of the filaments in the yarn are broken, or at least some of the filaments remain unbroken, so that the continuity of the yarn is not interfered with.

In order that the yarn may not wrap around the fluted rollers when it is broken above said rollers, an interrupter or drop wire is provided to break the yarn below the rollers. This serves

the additional purpose of avoiding waste of yarn.

By way of example a form of apparatus according to this invention will now be described in greater detail with reference to the accompanying drawing in which the figure shows a perspective view of the device.

In the drawing, the reference numeral 1 designates a cross-bar on the frame of an up-twisting machine modified in accordance with this invention in which a yarn 2 is taken from a twisting bobbin 3 rotatably mounted on the spindle assembly, generally indicated by reference numeral 4, which is rotated by belt 5. The yarn is passed through pigtail guide 6 which is attached to cross-bar 1 by means of a screw 7, and then through a pair of rollers 8 and 9 one or both of which are fluted spirally or otherwise. The edges of the teeth of the fluted rollers are of course somewhat dull as teeth with sharp edges would destroy the yarn. Roller 8 is fixed on a shaft 11 which is positively driven by any suitable means in the direction of travel of the yarn 2, while roller 9 is an idler roller which, in operative position, rests on and is driven by roller 8 and is of such weight as to have the desired cutting action on the bundle of filaments.

Roller 9 is mounted on a shaft 12 which is mounted for free vertical movement in slotted bearings 13 in bracket 14 suitably attached to cross-bar 1. The yarn is then passed in contact with a tubular thread guide 15 of porcelain or other suitable material on a drop wire 16 which is pivotally mounted on a screw or bolt 17 in the bracket 14. The yarn is then passed through a thread guide 18 mounted on a reciprocating traverse bar 19 and on to take-up bobbin 21 which is mounted for free vertical movement in bearings 22 in brackets 23. The take-up bobbin is rotated by means of a roll 24 which may be cork covered, as is well understood in the art.

The drop wire 16 is provided for the purpose of preventing the yarn from lapping about the rollers should the yarn break above the same. As shown in full lines in the drawing, the drop wire is in the position which it assumes during the running of the device. When the yarn breaks above the rollers, the drop wire falls to the position shown in dotted lines and a hooked portion 25 integral with the drop wire 16 cooperates with the loop 26 of a finger 27 pivotally mounted on a bolt or screw 28 to move the finger into the path of the balloon 29 formed by the rotating yarn to break the said yarn.

The operation of my device is as follows: Yarn

supplied by bobbin 3, having a denier of 200 has a twist of 15 to 20 turns per inch or other suitable twist inserted therein by the rotation of the bobbin 3. The yarn then passes through the pig-tail guide 6 and through the rollers 8 and 9, which are about 2 inches in diameter and the lower one of which, roller 8, is positively driven at a speed of about 43 R. P. M. From the rollers where the filaments are cut, the bundle is passed in contact with drop-wire 16 and traversed on to the take-up bobbin 21 which is rotated by means of roller 24 which is approximately 4 inches in diameter and is driven by shaft 31 at a speed of about 47 R. P. M. The yarn is thus drawn between the cutting rollers 8 and 9 at a higher speed than the peripheral speed of the rollers. It will, of course, be understood that only roller 8 may be fluted and that roller 9 may have a flat surface, and also that abrasive rollers, i. e. rollers composed of or covered with carborundum or emery or other abrasive substance, may be used instead of the fluted rollers.

The average length of staple fiber has an important bearing on the appearance and other qualities of the product produced according to the invention. This may be controlled by suitable adjustment of the apparatus and its conditions of operation, as well as by selection of the yarn to be treated. Thus, in general, a higher rate of operation of the cutting rolls results in a longer average fiber length being obtained. A greater amount of twist in the filament bundle tends to reduce the average fiber length. Moreover, greater pressure at the cutting device (this pressure depending also upon the size of the yarn to be treated and the number of filaments it contains) reduces the average fiber length, as also does an increase in the ratio between the speed of travel of the yarn and that of the cutting devices. Finer filaments are usually more readily cut, and the more frequent cutting has the effect, of course, of reducing the average fiber length.

As indicated above, greater pressure at the cutting device is necessary with increase in the size of the yarn. Finer filaments, however, require less pressure than coarser filaments. Moreover, a lower ratio between the speed of travel of the yarn and that of the cutting devices calls for higher pressure.

What is desired to be secured by Letters Patent is:

1. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point substantially above and in line with the spindle of the twisting means, a movable cutting roller over which the yarn is caused to move on its way to the take-up means, an idler roller adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of the cutting roller, the cutting roller being adapted to move at a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the severing roller upon breakage of the yarn at a point above the severing roller.

2. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means

for taking-up the same at a point above the twisting means, a movable fluted cutting roller over which the yarn is caused to move on its way to the take-up means, a second roller adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of the cutting roller, the cutting roller being adapted to move at a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the severing roller upon breakage of the yarn at a point above the severing roller.

3. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point above the twisting means, a movable spirally fluted cutting roller over which the yarn is caused to move on its way to the take-up means, a second spirally fluted roller adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of the rollers, the cutting roller being adapted to move at a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the severing roller upon breakage of the yarn at a point above the severing roller.

4. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point above the twisting means, a movable cutting roller over which the yarn is caused to move on its way to the take-up means, a second roller adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of the cutting roller, the cutting roller being adapted to move at a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the rollers upon breakage of the yarn at a point above said rollers.

5. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point above the twisting means, a movable cutting roller over which the yarn is caused to move on its way to the take-up means, a second roller adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of the cutting roller, the cutting roller being adapted to move at a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the rollers upon breakage of the yarn at a point above said rollers, said means including a finger adapted to be moved in the path of the bundle.

6. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point substantially

above and in line with the spindle of the twisting means, a movable spirally fluted cutting roller over which the yarn of filaments is caused to move on its way to the take-up means, a second spirally fluted roller adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of the rollers, the cutting roller being adapted to move at a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the rollers upon breakage of the yarn at a point above said rollers.

7. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point substantially above and in line with the spindle of the twisting means, a movable spirally fluted cutting roller over which the yarn is caused to move on its way to the take-up means, a second spirally fluted roller adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of the rollers, the cutting roller being adapted to move at a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the rollers upon breakage of the yarn at a point above said rollers, said means including a finger adapted to be moved into the path of the yarn.

8. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point above the twisting means, a positively driven cutting roller over which the yarn is caused to move on its way to the take-up means, a bracket above said cutting roller, said bracket having vertical slotted bearings therein, an idler roller mounted for vertical movement in said bearings and adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of said cutting roller, the cutting roller being adapted to move with a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the severing roller upon breakage of the yarn at a point above the severing roller.

9. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber com-

prising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point above the twisting means, a positively driven fluted cutting roller over which the bundle of filaments is caused to move on its way to the take-up means, a bracket above said cutting roller, said bracket having vertical slotted bearings therein, a fluted idler mounted for vertical movement in said bearings and adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of said cutting roller, the cutting roller being adapted to move with a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the severing roller upon breakage of the yarn at a point above the severing roller.

10. Apparatus for the conversion of a yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point above the twisting means, a positively driven fluted cutting roller over which the yarn is caused to move on its way to the take-up means, a bracket above said cutting roller, said bracket having vertical slotted bearings therein, a fluted idler mounted for vertical movement in said bearings and adapted to make contact with said cutting roller to keep the yarn continuously pressed against the surface of said cutting roller, the cutting roller being adapted to move with a peripheral speed which is less than the peripheral speed of the take-up means, whereby there is obtained slippage of the yarn past the rollers, and means for breaking the yarn at a point below the rollers upon breakage of the yarn at a point above said rollers, said means including a finger adapted to be moved into the path of the yarn.

11. Apparatus for the conversion of yarn comprising a bundle of continuous filaments into a continuous product containing staple fiber comprising, in combination with a device having means for inserting twist into the yarn and means for taking-up the same at a point above the twisting means, a movable severing roller over which the yarn is caused to move on its way to the take-up means, rotatable means for causing the yarn to make contact with the severing roller to keep the yarn continuously pressed against the surface of the severing rollers, and means for breaking the yarn at a point below the severing roller upon breakage of the yarn at a point above the severing roller.

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