March 8, 1949. A. KÜNZLE 2,463,619

PROCESS AND APPARATUS FOR PRODUCING CURLY EFFECTS ON YARN

Filed March 25, 1946

Fig. 1.

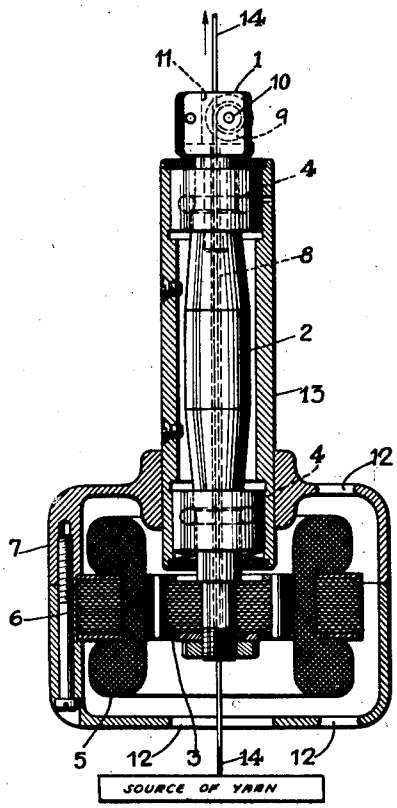



Fig. 3.

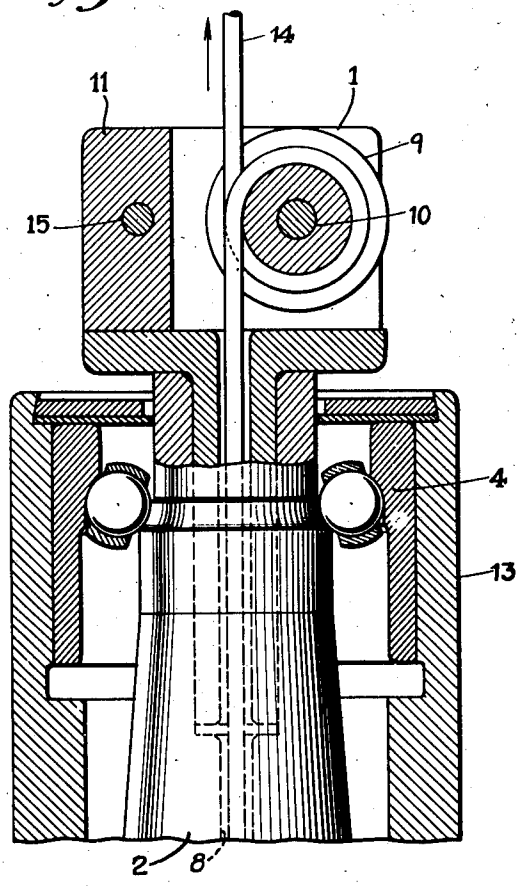



Fig. 2.

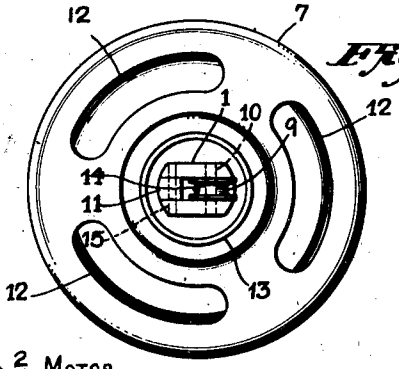
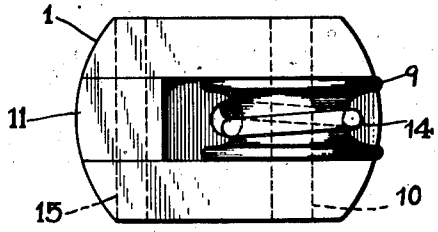



Fig. 4.



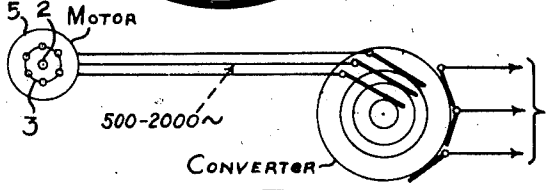




Fig. 5.

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# UNITED STATES PATENT OFFICE

2,463,619

## PROCESS AND APPARATUS FOR PRODUCING CURLY EFFECTS ON YARN

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Application March 25, 1946, Serial No. 656,865
In Switzerland March 29, 1945

4 Claims. (Cl. 57—58.5)

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This invention relates to a false twisting device and a method for producing curly effects in yarn by means of such false twisting device.

False-twisting devices, especially for the production of crimp-effects on continuous filaments of artificial silk and the like, are described in United States Patents Nos. 2,089,198, 2,089,199, 2,111,211, 2,089,239. These devices are provided with a twisting member (twister "head"), adapted to be set in rotation and to impart a temporary high twist (false twist and a back twist) to the initial twist of a yarn traveling therethrough.

Since, in order to obtain an efficient crimping effect, yarn with a count, for example of 450 deniers, must be given a twist of about 1000–1500 turns per metre; it will be evident that, for successful practical operation, the yarn must pass through the device at very high speeds which, in turn, makes it necessary for the false-twister heads to perform an enormous number of revolutions. For example, a 450 denier yarn moving at a speed of 60 metres per minute (equal to 1 metre per second) would require the twister-head to make a speed of 1000–1500 turns per second or 60,000–90,000 per minute. In the case of a yarn weighing about 50 grams per 1000 metres (corresponding to a production of 50 milligrams per metre second of yarn speed), the output during a day of 24 hours would amount to 4.3 kg. per twister-head. However, to obtain this output it would be necessary to use a false-twister with the very high speed of 60,000–90,000 turns per minute. Ballooning would take place in devices heretofore proposed and at such speeds this would be particularly damaging.

An object of the present invention is to provide an improved construction of mechanism of this kind whereby among other advantages any ballooning of the filament is prevented.

It is also an object of my invention to provide a simple process for false twisting yarn in which the yarn may be handled at the high speeds required.

In carrying out the process of my invention I pass the yarn which may be artificial silk or other textile along the longitudinal axis of a rotating twisting head, rotating the head and yarn at a speed of the order of 50,000 R. P. M. or more and maintaining the yarn aligned with the longitudinal axis as it enters and leaves the head.

According to the invention, the false-twist mechanism comprises a false-twister head, which is mounted at one end of a hollow shaft of an A. C. motor, fed with alternating current of

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500–2000 cycles per second. As a further development of the device, all ballooning of the thread is prevented by means of a false-twister head having a central thread guide. As an A. C. motor, it is advantageous to use a three-phase motor with short-circuited armature. It has also been found advantageous to polish the bore of the said shaft in order to present only a minimum of resistance to the forward traveling movement of the filament. In order to obtain the requisite medium-frequency alternating current, it is advantageous to use the known frequency converter with which it is easily possible to convert A. C. of 50 cycles per second into a periodicity of 2000 cycles per second.

The accompanying drawings serve to illustrate the invention by way of example.

Fig. 1 is a longitudinal section through a false-twist device; Fig. 2 is a plan thereof; Fig. 3 is a longitudinal section, through the twister-head and its mounting, but drawn to a larger scale; Fig. 4 is a plan of the twister head also drawn to a larger scale; and Fig. 5 is a diagrammatic showing of the circuit connections for the motor used.

In these figures, 1 represents the twister-head, 2 the motor shaft, 3 the rotor of the hollow motor, 4 ball bearings for the shaft 3, 5 the stator winding, 6 the stator plates, 7 the motor housing, 8 the axial bore of the motor shaft, 9 the small roller, 10, the axis of the said roller 9, 11 the counterweight for balancing the twister-head, 12 ventilation orifices, 13 the sleeve, 14 the filament or yarn, and 15 represents the cotter for fixing the counterweight 11 in the head 1.

The arrows in Figs. 1 and 3 indicate how the yarn—composed for example of numerous individual filaments—is passed round a groove in the roller 9 and then passes out of the false-twist device. It has been found advantageous to allow the yarn to traverse the false-twist mechanism in the direction indicated by the arrows in Figs. 1 and 3, since, in such case, it passes in a highly twisted condition through the axial bore 8 of the rotor shaft 2 and thus has a substantially lower frictional resistance than if passed through the bore 8 in the opposite direction and thus in a retwisted crimped condition.

The central guidance of the thread is obtained, in this instance, by disposing the guide-groove roller 9 of the twister head mounted on the axis 10 at right angles with the axis of the sleeve in the twist mechanism in such a manner that its perimeter is approximately tangential to the axis of the sleeve, whilst for counterbalancing the twister head with regard to the centrifugal force

generated by this method of mounting the roller, the counterweight 11 is provided which is secured by means of the pin 15. The axis of the bored shaft 2 coincides with that of the twister head and the path of straight line travel of the filament, as shown, corresponds to this axis. The axis of the roller 9 is eccentric to said path of travel. Another solution is described in the specification of the copending patent application Ser. No. 553,694.

The whole arrangement, that is, the motor and twister head, can be held in a simple manner, for example by clamping the sleeve 13 between two jaws.

In employing the apparatus of my invention at the speeds indicated, it is apparent that the yarn is rotating at the order of fifty thousand R. P. M. or more and at the same time is traveling over the roller 9 linearly at the order of one meter per second. In spite of these high rotational and linear speeds, I was surprised to find that the yarn does not break. This machine is in commercial operation and has produced thousands of yards of twisted yarn. One of the important factors which makes it possible to move the yarn at these speeds is that the face of the roller 10 is always substantially tangent to the longitudinal axis of the head and accordingly the yarn is delivered to the head and leaves it substantially aligned with the longitudinal axis.

The described embodiment according to the drawing by no means exhausts the subject of the invention, since modifications directly evident to the mechanician may be made without departing from the scope of the invention.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. A process for producing curly effects on yarn which comprises, passing the yarn along the longitudinal axis of a rotating twisting head, rotating at a speed of the order of fifty thousand R. P. M., the yarn being of the order of 450 denier and being passed at the rate of the order of about one meter per second, maintaining the yarn aligned with the longitudinal axis of the head as it approaches and leaves same and crimping the yarn.



2. An apparatus for imparting a false twist to yarn which comprises, in combination, a source of supply of yarn, a rapidly rotatable bored shaft having its axis corresponding to the path of straight line travel of the yarn passing therethrough, a guide roller with a groove, said roller rotating on an axis perpendicular to that of said bored shaft and eccentric with respect to said line of travel, and said roller being disposed so that the yarn leaves it at a point substantially along the path of said axis of said shaft, and a motor mounted on said bored shaft for rapidly rotating said shaft together with said roller perpendicular to the line of travel of the yarn as the yarn passes over said roller.

3. An apparatus for imparting a false twist to yarn which comprises, in combination, a source of supply of yarn, a rapidly rotatable bored shaft having its axis corresponding to the path of straight line travel of the yarn passing therethrough, a guide roller with a groove mounted on said shaft, said roller rotating on an axis perpendicular to that of said bored shaft and eccentric with respect to said line of travel, and said roller being disposed so that the yarn leaves it at a point substantially along the path of said axis of said shaft, a counterweight mounted on said shaft opposite said roller, and a motor mounted on said bored shaft for rotating said shaft together with said roller perpendicular to the line of travel of the yarn as the yarn passes over said roller, said roller being arranged to rotate with said shaft at a speed of the order of above 50,000 R. P. M.

4. An apparatus in accordance with claim 2 in which the bored shaft is polished.

AUGUST KÜNZLE.


REFERENCES CITED

The following references are of record in the file of this patent:

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| Number | Name | Date |
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| 630,567 | Sawyer et al. | Aug. 8, 1899 |
| 1,565,862 | Massingham | Dec. 15, 1925 |
| 1,725,849 | Cope | Aug. 27, 1929 |
| 2,089,239 | Whitehead | Aug. 10, 1937 |

## Certificate of Correction

Patent No. 2,463,619. March 8, 1949.

AUGUST KÜNZLE

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 2, line 26, before "motor shaft" insert *hollow*; same line, before the syllable and hyphen "mo-" strike out "hollow"; line 30, after the numeral "10" strike out the comma;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of August, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
*Assistant Commissioner of Patents.*