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ANALYSIS OF CONSTRUCTIVE CHARACTERISTICS OF THE SUPPLY ZONE SUPPLY CYLINDER OF SPINNING MACHINES

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Abstract
In the article, the main stages of fiber impact in the discretizer drum: supply, discretization, transportation, separation, and then cross-connected transportation with air are carried out.

Keywords: spinning machine, discretization, discretization drum, fiber, tape, feeding cylinder, rubber sleeve, speed, grip angle, hardness, deformation, radius.

Introduction

The high level of competition in the world market for spun yarns and fabrics, modern advanced technologies, the creation of equipment that allows for a quick change in the quality and quantity of types of fabrics, the need to obtain high-quality and competitive products, and further improve the quality of textile products are of great importance. Currently, 24-25 million tons of cotton fiber are produced annually in the world. In developed foreign countries, such as the USA, Japan, Germany, Italy, and China, certain achievements have been made in the production of yarns with high quality and physical and mechanical properties, and special attention is paid to improving the methods of controlling technological processes in order to increase the efficiency of the textile industry, use new resource-saving equipment, machines, and ensure the competitiveness of products. The main stages of the impact on the fiber in the discretizing drum are: supply, discretization, transportation, separation, and the implementation of interconnected transportation with the final air [1, 2, 3, 4]. Figure 1 shows the discretization zone of the fiber skein in the spinning machine. The provision of fiber optic cable is made between 0 and 4 points. Here, 0 is the direction of entering the fiber skein condensing funnel, 1 is the direction of exit from the squeegee funnel, 2 is the initial compression zone of the fiber skein between the supply cylinder and the supply table, 3 is the compression surface, and 4 is the final compression zone of the supply device.

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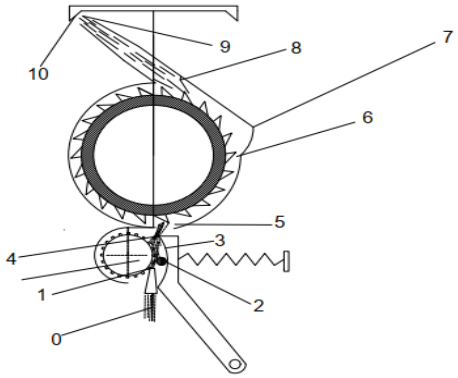
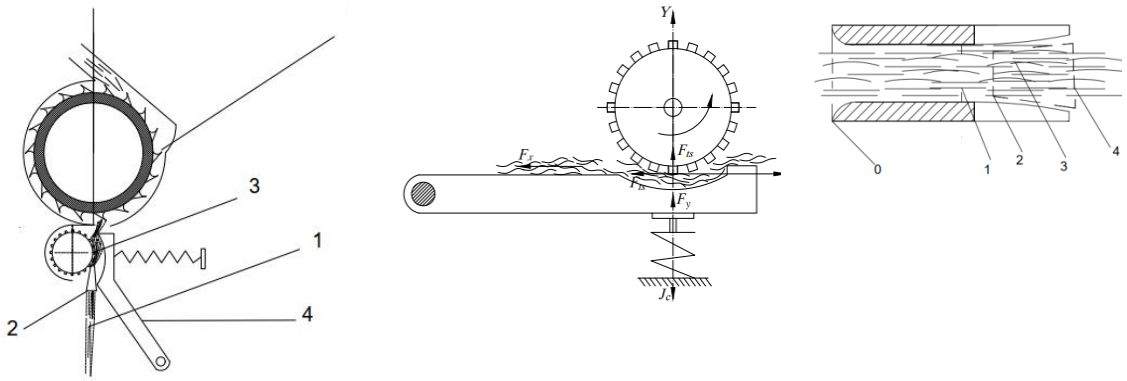


Picture 1. Schematic diagram of the movement of the fiber skein in the device on the spinning machine

The discretization zone consists of the environment and points 5 and 6 acting on the wick. Here, 5 is the discretization line of the fibers in the headset, and 6 is the final point of the fiber bundle. The transportation zone is marked in the drawing by 6 and 7, which are the movement lines of the fibers that have undergone the discretization process. Here, the last point of fiber transportation can be seen through 7. The last point of separation of the fibers from discretization is point 8. It is clearly seen from the figure that point 8 is the tooth of the discretization drum. In the fiber transportation zone, the fibers are combined by air at points 8 and 10. Here, point 9 is the exit point of the transportation channel. 10 is the exit path of the fibers to the rotor. The movement line of the supply zone is fully illustrated in Figure 2. The fiber wick is taken from the wick 1 and first enters the compacting funnel 2. Then it is struck by a grooved cylinder 3. In this case, a table 4 that provides controlled movement helps to implement it. If we pay attention to the fibers being removed from the net, there are almost no acting forces, therefore, there is no redistribution of the fiber wick along its length. This process continues until the fiber wick enters the supply zone. Then the fiber wick is driven through the teeth of the cylinder 3 and hits the drum head 5, and the discretization process is carried out. Another important working body in the supply zone, the supply table 4, also performs its functional work in implementing the controlled movement of the fiber wick [5-9].



a b c

Picture 2. Supply device

a- View of the cylinder supplying the fiber roving with the direction of the axis; b- Forces acting on the fiber roving; c- Sectional view of the thickening funnel;

The results of observations and research indicate that the only thing that troubles engineering technologists is to keep the fibers in the fiber roving at the same thickness without damaging them and to transfer them stably from the supply zone to the discretization zone.

For this, supply cylinders of two types of configurations are mainly used. One of these is the feed cylinders with a layered corrugated groove, in which the arrangement of the teeth can be arranged parallel to each other to the axis of rotation of the cylinder or in a diagonally inclined or spiral direction [10, 11, 12 Catling H. Open-end spinning and yarn quality.Berlin,2006, p.339-340]

The other type of them has a pyramidal, grooved shape. Both of the above-mentioned two types of feed cylinders have their disadvantages and advantages at the same time. The corrugated surface of the feed cylinders has the property of controlling the fibers and at the same time serves to change the distance between the compression line directed to the discretizing drum [13].

Thus, the discretizing drum teeth first collide with the fibers of the fiber wick and the discretizing process is carried out. If the distance between the compressed fibers in the feed zone and the drum teeth is too small, the discretizing drum teeth will lead to fiber breakage and the stability of the process will begin to deteriorate.

If the distance between the compressed part of the fiber wick and the drum teeth is related to the following expression by the limits, the fiber breakage indicators will decrease significantly [14-16]. The main data on the limits will depend on and - fiber length, mm; - fiber flattening coefficient, depending on the process in the carding machine (the accepted value is 0.65).

It should be noted that if the surface of the corrugations is increased to 12 mm2, and the distance between the compressed fiber wick in the supply zone and the discretizing drum is 9 mm, then the period of fiber breakage during discretization is not observed throughout the machine. The above-mentioned situation is an opinion expressed as a result of observing the process from only one point, and in addition, if we correlate the distance difference in this case with the slope of the supply cylinder, then the breakage of the discretizing fibers is practically not observed. Currently, the supply cylinders of 90% of pneumatic spinning machines are designed based on this theory [17-20].

Conclusion

1. Based on the analysis of existing studies, when delivering the fiber roving from the supply zone to the discretization zone, the supply cylinder is not sufficient to smoothly deliver the fiber roving and transfer them without damaging them. Also, even if the mutual parallelism and density of the fiber roving are always the same, the fiber roving does not reach the discretization drum smoothly.

2. The main parameters for obtaining high-quality yarn in a pneumatic spinning machine should be to separate the fiber roving in a non-contact manner during the discretization process

and transfer the separated fibers to the spinning device while maintaining their parallelism on the basis of the same supply.

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