



DEVELOPMENT OF EFFECTIVE DESIGN SCHEMES FOR THE FEED CYLINDER AND FEED DRUMS OF THE DISCRETIZING ZONE OF A SPINNING MACHINE

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We know that the development and recommendation of a new feed cylinder design, which combines the properties of several types of fiber rovings with the shape, configuration, type, design and other parameters of the feed cylinder, is an urgent problem for today's textile industry (Fig. 1) [1].

ABSTRACT

In the article, a new feed cylinder design is developed and recommended, which combines the properties of several types of fiber rovings with the shape, configuration, type, design and other parameters of the feed cylinder.

Through this type of supply cylinder, the displacement of the fiber skein is directed from the outer edges of the cylinder teeth towards its center. This, in turn, serves to ensure that the fiber wick goes to the teeth of the drum in a controlled manner. Now we pay attention to the structural structure of the supply cylinder construction. On the outer surface of the supply cylinder, there are teeth in the form of bumps and grooves, which are made parallel to the axis of the cylinder. Their width decreases from the initial three edges to the middle and continues to grow from the middle to the edge.

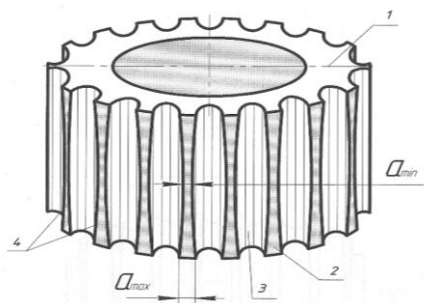


Figure 1. The supply cylinder of the spinning device

The technical essence of the design is that the supply cylinder of the spinning device has grooves with a convex outer surface and grooves parallel to the axis of the mutual cylinder. There are ridges on the outer surface of the bumps. Its width is made in such a way

that their width decreases from the top to the middle of the cylinder and again increases from the center. The minimum difference between the thicknesses is $0.15 \div 0.35$ mm compared to the ridges.

We will explain the construction of the invention by drawing. Figure 1 shows an overview of the supply cylinder. The design of the supply cylinder 1 consists of a grooved protrusion 2 and a recess 3, and the placement of the cylinder teeth in such an arrangement increases the efficiency of supply.

The width of the ribbed recess 2 is recommended to have a maximum value in the peripheral zones and a minimum value in the middle of the cylinder 1. The difference between the maximum and minimum dimensions is $0.15 \div 0.35$ mm. The side edge of the recess 2 is formed along the length of the cylinder 1 by 4 inclined recesses.

The fibrous mass in the form of a wick passes through the compacting hopper and reaches the supply zone. In this case, the fiber wick is fed by the supply cylinder 1 with the help of a grooved ridge 2 and a groove 3. In this process, the fiber wick is compressed with the help of a grooved ridge 2 and a supply table.

The process of supplying fiber wick to the discretization zone is carried out in the following manner. Here, the pressure exerted on the fiber wick is distributed uniformly along the entire feed cylinder teeth due to fiber displacement. Here, due to the misdistribution of the fiber pile, the width of the bulges 2 of the cylinder 1 is selected as follows:

$$a_{\max} - a_{\min} = 0.15 \div 0.35 \text{ MM}$$

where, a_{\max} , a_{\min} – bulges 2 minimum and maximum values of the width of the. In this process, the amount of fibers in the wick increases in the middle of the cylinder 1, and in this zone, the stability of the supply is achieved due to the increase in the volume of the depression 3 of the cylinder 1. Further, the fiber wick moves without braking from the supply zone to the separation zone. Here, the density of the fiber wick increases in the peripheral parts of the supply cylinder 1, and at the same time, the supply of the fiber wick with a uniform density relative to its width from the supply zone to the separation zone is stabilized.

Another invention provides a feed cylinder design that implements methods for smoothly transporting the fiber sliver from the feed zone to the discretization zone. The novelty of this invention is that it prevents damage to the fiber sliver that has entered the feed zone, in addition, it increases the energy efficiency of the machine, and the need for cylinder repairs is reduced.

This problem is solved in that the serrated teeth of the feed cylinder are arranged in a combination form, and in addition, a belt element is cast on their base to stably control the movement of the fiber sliver.

The design of the feed cylinder is made composite and separable, and the part where the teeth are placed consists of a prismatic groove, the direction of which is in the same direction as the direction of the axis of the feed cylinder. The type of teeth installed in the feed cylinder is divided into four types. In the first type, the teeth do not have grooves, that is, they are made flat. In the second type, the grooves are made parallel to the axis of the cylinder, and in the third variant, the grooves are arranged parallel to each other based on a certain step. In the fourth variant, the arrangement of the cylinder teeth is coordinated with the first and third types of teeth. In addition, it should be noted that there is a sliding base under each tooth.

In this recommended variant, the feed cylinder teeth continue to move smoothly and stably in a controlled manner in the feed zone to the discretization zone in a fiber wick, preventing the fibers from braking during movement. By placing a rubber bushing on the base of the cylinder, damage to the fibers in the fiber wick is reduced. The construction is represented in two different drawings, drawing 1 shows the longitudinal groove of the cylinder, and drawing 2 shows the prismatic shapes of the proposed teeth.

The structure of the supply cylinder consists of a cylinder 1 (Fig. 1.2), which is mounted on a drive shaft 2, and an internal bushing 3 is the basis for its orderly arrangement. After the inner bushing 3 there is a belt bushing 4, which is placed in the outer bushing 5. The outer bush 5 has prismatic grooves 6 located in the direction of the axis of the cylinder, and they are located in the direction of the trapezoidal cross section from the outer surface.

The prismatic parts 7 are placed in the groove 6 in four variants. In (I) there is a cylinder 8 with a prismatic ridge without a groove, in (II) there is a tooth 9 with a groove parallel to the axis of the cylinder 1, and in (III) there are ridges 10 arranged in parallel in a certain step. Each ridge 10 has a square shape. In (IV) there is a combination of the 8th and 10th tooth types of the tooth 11 of the cylinder 1. The arrangement of teeth 8, 9, 10, 11 in the tooth 7 is arranged in a sequential manner along the entire supply cylinder. As a result of the impact of the cylinder tooth 7 supplying the fiber wick, a cyclic period is observed in the movement of the fibers and the fiber wick reaches the discretization zone smoothly and stably. Such a cyclically distributed fiber wick is compacted by the teeth of the discretizing drum in parallel with each other, which makes it possible to obtain a yarn with high structural quality indicators. The fibrous mass first passes into the compacting funnel in the form of a wick, and then, having a certain shape, is placed in the feeding zone between the two working bodies, the table and the cylinder, by mutual movement. (This situation is not fully illustrated in Figure 1.2). In this process, the fiber wick is compacted by the teeth 8,9,10,11 of various shapes included in the feeding table and the part 7. Here, the compaction process is periodically repeated by the rotational movement of the teeth 8,9,10,11 located in the groove 6.

The rubber bushing 4 serves to absorb the impact of the teeth 8,9,10,11 on the fiber saw.

In this way, the process of smooth and stable delivery of the fiber saw from the supply zone to the discretization zone along the width is carried out, and this creates the possibility of obtaining yarn with high quality indicators.

In the recommended design, the outer surface of the sectional bushings is made in three rows, taking into account the possibility of replacing each row of teeth and needles. The height of the saw and needle sets is made by reducing the middle row of the drum by 0.4÷0.6 mm compared to the edge row [61,62].

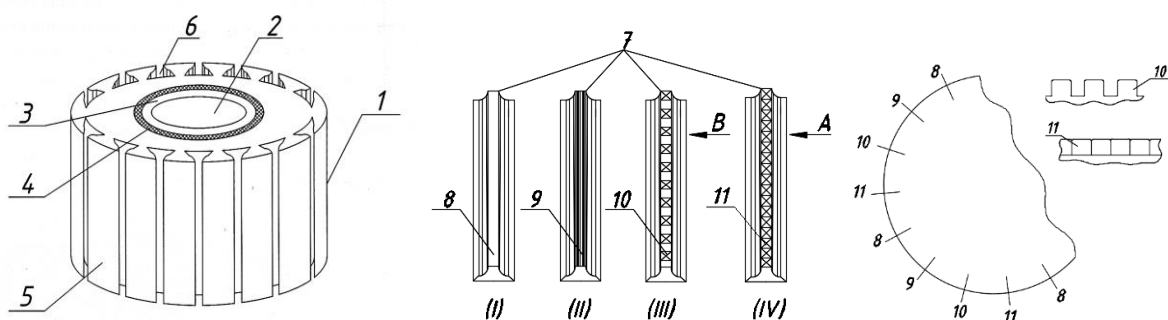


Figure 2. A cylinder that separates the fiber wick into complex fibers

Dividing the sets into sectional sleeves and creating an environment for replacing the saws and needles in them in rows increases the intensity (vigor) of the fiber wick discretization process, while also making it possible to replace damaged saws and needles in sectional rows at the same time.

Хулоса

1. Based on the analysis of existing studies, when transporting the fiber roving from the supply zone to the discretization zone, the supply cylinder is not sufficient to smoothly feed 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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