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RING SPINNING MACHINES ON THE INFLUENCE OF THE SHAPE OF THE YARN CARRIERS ON THE DISTRIBUTION AND TENSION OF THE YARN

Quliev T. M.
Doctor of Technical Sciences, Professor
Uzpakhtasanoat Scientific Center, Tashkent, Uzbekistan

Jumaniyazov Q.
Doctor of Technical Sciences, Professor
Uzpakhtasanoat Scientific Center, Tashkent, Uzbekistan

Djumabaev G. X.
Doctor of Philosophy in Technical Sciences, Associate Professor
Chirchik State Pedagogical University, Chirchik, Uzbekistan
djumabaev.g@cspi.uz

Abstract
Thread guides of various shapes have been studied, and among them a thread guide is recommended, which is less affected by changes in the unevenness of the thread as a result of twist spreading.

Keywords: conductors, thread, twist.

HALQALI IP YIGIRUV MAShINALARI IP O‘TKAZGIChLAR ShAKLINING BURAM TARQALIShI VA IP TARANGLIGIGA TA’SIRI

Quliev T. M.
Texnika fanlari doktori, professor
O‘zpaxtasanoat ilmiy markazi, Toshkent, O‘zbekiston

Jumaniyazov Q.
Texnika fanlari doktori, professor
O‘zpaxtasanoat ilmiy markazi, Toshkent, O‘zbekiston

Djumabaev G‘.X.
Texnika fanlari bo‘yicha falsafa doktori, dotsent
Chirchiq davlat pedagogika universiteti, Chirchiq, O‘zbekiston
djumabaev.g@cspi.uz

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Annotatsiya:
Turli shakldagi ip o‘tkazgichlar o‘rganilgan bo‘lib, shulardan buram tarqalishi natijasida ipning notekisligi o‘zgarishiga ta’sir etuvchi ip o‘tkazgich tavsiya qilingan.

Kalit so‘zlar: o‘tkazgichlar, ip, buram.

Introduction

In ring spinning and spinning machines, the yarn guide is the main working part of the machine, which ensures the correct location of the fiber in the single yarn and the yarn in the spun yarn along the thread axis along the thread axis [1, 2].

Currently available yarn guides consist of three groups:

- yarn guides that affect only the twist distribution in the zone of the yarn guide and the drawing device;
- yarn guides that affect only the yarn tension in this zone;
- yarn guides that satisfy both requirements.

It has been proven that the lag of the twist distribution is a decrease in twist, and it affects two main parameters in yarn formation, namely the speed of the yarn movement towards the tube and the twist distribution between the runner and the point of compression of the fiber bundle between the drawing device [3].

As a result of changes in both parameters, the yarn breaks. Many scientists believe that the vibration of the yarn leads to a rapid spread of the twist, and in this case, the yarn breaks less often.

Various designs of yarn feeders that vibrate the yarn have been analyzed in detail in the scientific works of Rashidov T.R., Mardonov B.M., Ibragimov X.X., Melibaev U.X., and Alishev Sh.K. [4, 5, 6]. The main ones are described below. One of them is a groove in the roller based on the Archimedes spiral, and when the yarn passes from a small diameter to a large diameter in the groove, and from a large to a small diameter, the yarn vibrates 600-800 times per minute, and the twist spreads quickly.

The amplitude of the oscillations is 2.2-3.5 mm, in which the distance between the yarn feeder and the needle is large, which increases the height of the machine, increases the iron consumption, and increases the cost of the machine.

In another type of design, the yarn is struck. In this case, according to the author, due to the impact on the yarn at a high frequency, the twist in the yarn is distributed quickly and evenly as a result of the regular interruption of the contact between the yarn surface and the yarn. In this case, instead of decreasing the yarn breakage due to the impact on the yarn, the yarn breakage can also increase. The design of both yarn guides is very complex, and their continuous operation in the event of a yarn breakage makes it difficult to connect the broken yarn. Yarn guides of this design do not justify themselves. Rotating yarn guides are also recommended. For example, E.D. Mizonov's yarn guide vibrates the yarn using a ratchet.

Scientific research is being conducted in Russia, European countries, and our scientists on improving the design of rotating yarn guides.

N.M. Belitsyn in his study [11] experimentally studied a two-phase twisting yarn guide from new American spinning machines. According to the author, such a thread conveyor is not only

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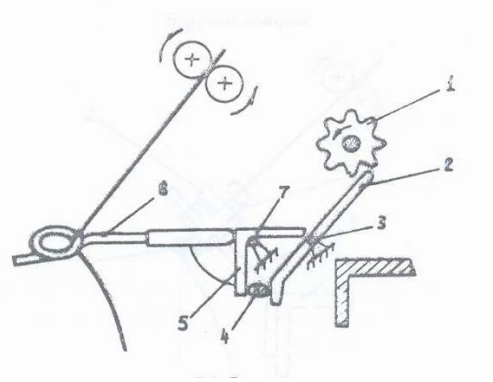
very complex in terms of construction, but also very difficult to connect when the thread breaks, it is difficult to find the end of the broken thread, and the friction between the rubber washer in the device and the thread is very high.

In recent years, many foreign scientists have proposed various rotating thread conveyors.

For example, in the literature [8, 9], a ring of thread conveyors is brought into rotational motion using a magnetic field.



1-star; 2-lever; 3-lever pivot; 4-rod; 5-thread guide slope; 6-thread guide; 7-valve pivot;

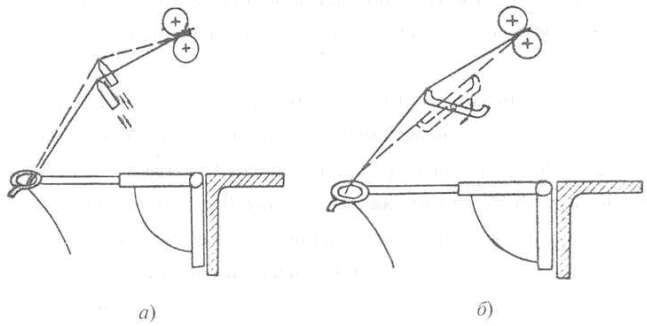
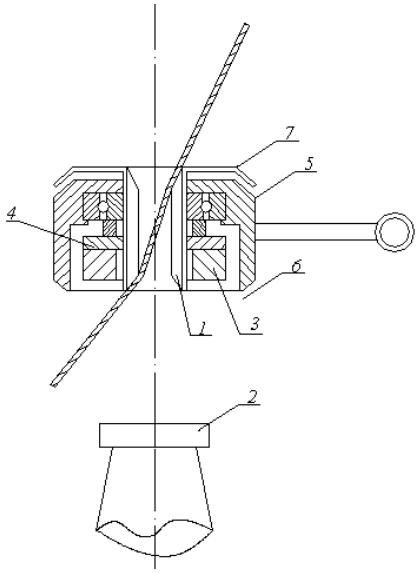


Figure 1. Yarn vibrating devices between the yarn feeder and the stretching device



1-thread eyelet; 2-magnetic nozzle; 3-magnetic ring; 4-coupling ring; 5-bearing; 6-fixed housing; 7-housing cover;

Figure 2. Magnetic field thread guide

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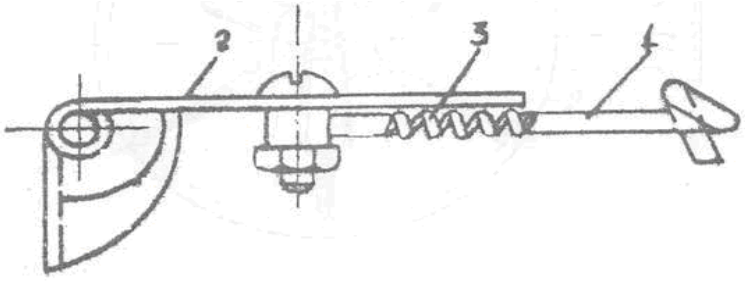
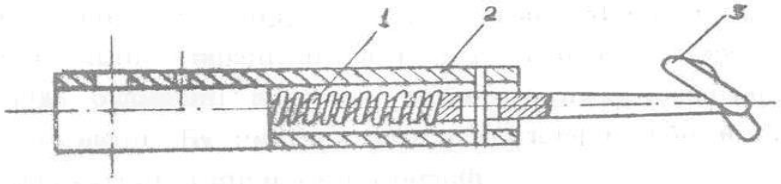
A fixed magnetic field is installed at the tip of the spindle. When studying the effect of a magnetic rotating spindle, also called Spinmaster, on the formation of the spindle, it was shown that the use of this spindle can increase the spindle speed by 30-35%. However, in all of the above spindles (spindle, two types of magnet, ring, bearing, lever, belt, etc.), the use of up to 8 parts was not profitable and did not justify their practical use due to the extreme complexity of the spindle design.

In the unusual spindle proposed in the Russian patent No. 107009, in addition to moving in a horizontal plane to the ring through which the spindle passes, it can also move along its vertical axis.

The author claims that such a spindle vibrates the spindle. It distributes the twist evenly, softens the dynamic shock that occurs in the cylinder, and improves the quality of the yarn between the front pair of the yarn guide stretching device and reduces the breakage. In this design, the spring stiffness is high to hold the yarn guide with a large mass.



1-movable eyelet thread guide; 2-valve; 3-cylindrical spring;



1-spring; 2- thread guide body; 3-thread guide eyelet;

Figure 3. Spring thread guide sensitivity decreases and it is quickly covered with fluff, it quickly breaks under the influence of high frequency and vibration.

These shortcomings are eliminated in the design of the thread guide proposed in the American patent No. 3269104, which evenly distributes the twist [11].

In order to evenly distribute the twist between the thread guide and the drawing device, it is most convenient to distribute the twist if the elastic thread guide can move in any direction in the horizontal plane. Among such thread guides, the device presented in the US patent No. 2344209 and No. 1335586 is noteworthy [12].

According to the US patent, a steel roller 1 is placed on a steel sleeve, the surface of which is an Archimedean spiral, consisting of a groove. When the thread changes places along the spiral, with different diameters, the thread vibrates 600-800 times per minute. However, even in this thread guide, when the thread breaks, it is difficult to pass it through the thread guide and it takes a lot of time.

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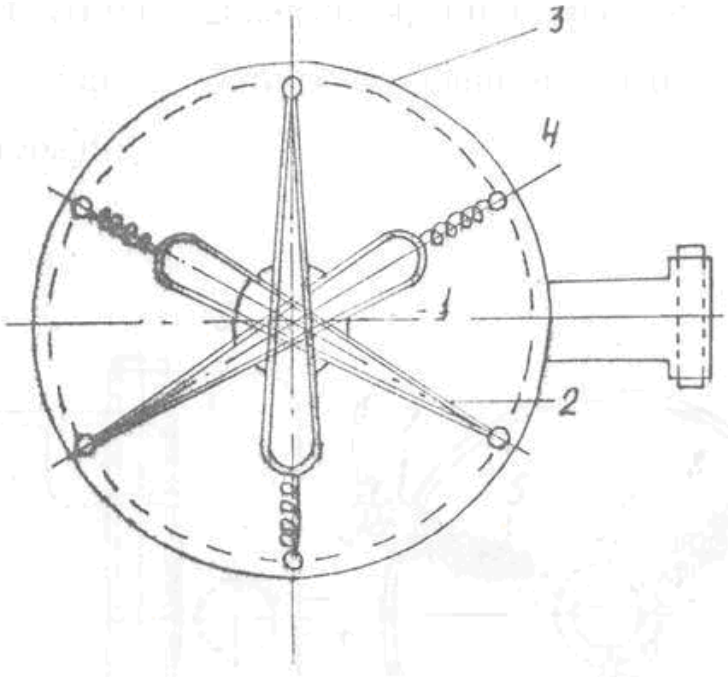

1-eyelet through which the thread passes; 2-forming elements; 3-body; 4-spring;

Figure 4. Archimedean spiral thread guide

The proposed belt thread guides by H.H. Ibrohimov, U. Meliboev and others are designed as follows [13]. The outer ring 1 is fastened to the valve 3 by means of a handle 2.

The thread guide ring 4 is located at an angle of 1200 by means of cylindrical springs 5, holding it in three places of the ring. The tension of the springs is adjusted by means of a screw 7, and its sensitivity is adjusted by means of a detail 6. Since the front side of the outer ring 1 is open, it is easier to pass the thread through a small ring slot than in existing thread guides, and the time spent on threading is also reduced several times.

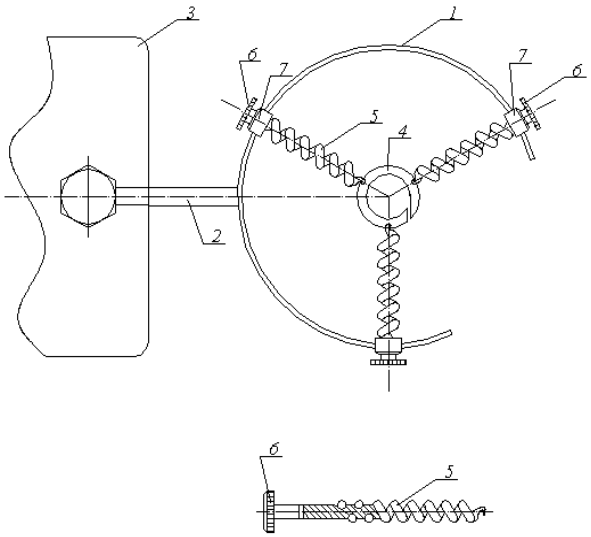

Figure 5. Threaded conductor with elastic element

It should be noted that this yarn feeder is not without its drawbacks, its design is complex, with 7 parts, and its manufacturing is expensive. The analysis of the yarn feeders presented above

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showed that the main problem in ring spinning and spinning machines is the uniform distribution of twists in the yarn feeder zone and in the cylinder as a whole, and despite the positive results achieved, none of the proposed yarn feeder designs have been implemented. Another major drawback of the existing yarn feeders is that most of the twists that should be fed to the yarn in the yarn feeder zone are blocked under the yarn feeder, which increases yarn breakage [12, 13, 14].

The yarn guide structure used in this work consists of a composite roller, a rubber bushing is placed on the roller axis, and a steel bushing is placed on the rubber bushing in accordance with it [15]. The yarn touches the outer steel bushing of the yarn guide (guide) and exerts a certain force on the bushing due to its tension. In this case, the inner rubber bushing deforms and plays the role of amortization. With a change in yarn tension, the rubber bushing deforms in the linear connection and causes the vibration amplitude of the outer bushing to increase. In this case, the yarn also vibrates in this way, leading to uneven transmission. The above considerations show that when studying each detail of the machine, attention should be paid to the practical use of that detail. All the considered yarn guides are excellent, easy to manufacture, and highly economical, some of them reduce yarn breakage by up to 30%, and the quality of the yarn is improved. Some of them are very simple and convenient in terms of design. However, they are not durable, no matter how simple and convenient they are, they cannot be used in practice due to their short service life; 1000 such yarn guides are used in one modern spinning machine. If a specialist wants to improve a machine part, device, or mechanism, he should pay attention to the following factors:

1- The simplicity of the design of the part;
2- Ease of use;
3- Durability, high service life;
4- Economic efficiency;
5- Low cost;
6- Competitiveness;

The considered thread conductors are very complex in design, consisting of 6-7 parts, and despite the good results, they are quite difficult to use in practice. Even if the thread breaks, they do not stop working, making it difficult to connect the thread.

The general disadvantage of the above yarn guides is that when the machine speed changes, when a yarn of a different linear density is switched to work, their elasticity cannot be adjusted to these parameters [17].

Conclusion. The yarn guide design recommended as a result of the studies consists of a composite roller, a rubber bushing is put on the roller axis, and a steel bushing is put on the rubber bushing in accordance with it [18]. The yarn touches the outer steel bushing of the yarn guide (in the guide) and exerts a certain force on the bushing due to its tension. In this case, the inner rubber bushing deforms and plays the role of amortization.

Адабиётлар

1. Тулаганова М.В., «Ҳалқали ип пишитиш машинасида ип ўтказгичларни пишитилган ип сифат кўрсаткичларига таъсири тадқиқи» Тошкент., «Магистратура талабаларининг илмий маколалар тўплам» 2017 й.

Web of Technology: Multidimensional Research Journal
webofjournals.com/index.php/4

2. Ибрагимов Х.Х., Кулметов М., ва бошк. «Йигириш мшиналари» Тошкент «Ўкитувчи» 1985 й. 85-86 бет.
3. Mukhamedov G., Djumabaev G., Makhmudova D., Usarov J., Khimmataliev D. Basis of the parameters of the spin extractor tool on the interned spinning machine //E3S Web of Conferences 402, 14033 (2023), TransSiberia 2023. https://www.researchgate.net/publication/372463327_Basis_of_the_parameters_of_the_spin_extractor_tool_on_the_interned_spinning_machine
4. Мелибаев У.Х. «Нитепроводник кольцевой прядильной машины» Инф. Листок №87-133, серия «О научных технической достижений», -Т., УзНИИНТИ, 1987г.
5. Павлов Ю.В., А.А.Минофьев, А.К.Ефимова, «Лабораторный практикум по прядению хлопка и химических волокон» Иваново 2006 г.
6. Ф.М.Плеханов «Теория прядения»-М; 2000г.
7. Djumabayev G‘.X. New effective structural scheme and principle ofoperation parameters for yarn stretching tool of ring spinning machine. G GOLDEN BRAIN ISSN: 2181-4120 VOLUME 1 | ISSUE 16 | 2023, https://t.me/goldenbrain_journal Multidisciplinary Scientific Journal June, 2023.
8. Джумабаев Ғ.Х. Ахмедов К., Матисмаилов С., Мардонов Б., Юлдашев А. Theoretical analisis of the interaction of discrete drum with head teeth with fiber. “To’qimachilik muammolari” Toshkent, 2021, №2, 13-20 b.
9. Kuliev T., Jumabaev G., Jumaniyazov Q. Theoretical study of fiber behavior in a new structured elongation pair // Scientific and Technical Journal of NamIET. Vol. 9 Issue 1. 2024. P. 86-95
10.. Қулиев Т.М., Джумабаев Ғ.Х., Жуманиязов Қ.Ж., Орипов Ж.И. Такомиллаштирилган чўзиш асбобида ипларда бурам ҳосил бўлиш жараёнидаги харакатининг динамик таҳлили // ФарПИ илмий-техника журнали. 2024, Т.28. махсус сон №2. 48-52 б.
11. Патент США № 3269104, «Нитепроводник кольцевой прядильной машины» кл.57-106, 1966 г.
12. России №1335586. Нитепроводник прядильной машины. 1978 год.
13. Авт. с вид. Нитепроводник кольцевой прядильной машины/ Ибрагимов Х.Х, Мелибаев У.Х, Бурнашев Р.З., Мардонов Б.М., Алишев Ш., Камедов Н.В. Бюллетень изобретений. №33. 1987г., с 90.
14. Джўраев А., Муқимов М.М., Умаров М.Н., Алишев Ш., ва бошқалар Трикотаж машинасининг игнадони» фойдали моделга патент № FAP 00339.
15. Ульянов А.В., «Совершенствование технологии получения армированной пряжи на кольцевой прядильной машине» Автореферат на соискание ученой степени д.т.н. Санкт Петербург 2003 г.
16. Джумабаев Г.Х. и др. «Исследование влияния усовершенствованного вытяжного прибора кольцепрядильной машины на касчество выпускаемой пряжи» Журнал «Проблемы текстилья» Ташкент. № 3., 2018 г.
17 .Павлов Ю.В. и др. «Теория процессов технология и оборудование прядения хлопка и химических волокон» Иваново 2000 г.

Web of Technology: Multidimensional Research Journal
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18. Патент UZ № FAP 00878 Ҳалкали йигирув машинасининг ип ўтказгичи// Джумабаев Ғ., Жуманиязов Қ., Жураев А., Ғафуров Қ., Мавлонов Т., Ғафуров Ж. // Расмий ахборотнома. -2014. -№2
19. Djumabaev G., Jumaniyazov K., Matismailov S.L. «Research of influence of thread guiders with flexible elements for the process of yarn formation» European science review Vienna 2018. November.
20. K.Djumaniyazov, G.Djumabaev, N.Juraeva, A.Xurramov "Analysis of Vibrations of the Rings of the Internal Spinning Machine" Cite as: AIP Conference Proceedings 2402, 070046 (2021); https://doi.org/10.1063/5.0072022 Published Online: 15 November 2021.
21. Джумабаев Г.Х., Жуманиязов К., Жураев А. Моделирование вынужденных колебаний нитепроводника кольцевой прядильной мащины// Проблемы текстилья. –Ташкент, 2014. №4. -С. 70-73.
22. Джумабаев Г.Х. Определение формы и натяжения баллонирующей нити с учетом сопротивления воздуха// Проблемы текстиля.- Ташкент, 2011, №3. -С. 53-54.

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