Analysis Of Scientific Works Conducted in the Literature on the Types of Tensioning Mechanisms in the Weaving Looms

F.A. Kozakov PhD Student, Namangan Institute of Engineering and Technology, Namangan, Uzbekistan
E-mail: qozaqovf@gmail.com

D.G. Aliyeva Candidate of Technical Sciences, Docent, Department of Textile Industry Products, Namangan Institute of Engineering and Technology, Namangan, Uzbekistan
E-mail: dilbaraliyeva57.@gmail.com

U.M. Ibrokhimov Master's student, Namangan Institute of Engineering and Technology, Namangan, Uzbekistan
E-mail: iulugbek666@gmail.com

ABSTRACT

In the weaving processes of the modern textile industry, the performance of the thread control mechanisms has a great impact on the quality of the fabric and the efficiency of the weaving process. This article presents an analysis of scientific works, articles and theses, and literature by experts and researchers related to the types and working order of tensioning mechanisms in various types of weaving looms, as well as warp and weft tensions.

Keywords: Weft thread, tension, tensioning mechanisms, Warp thread, technical requirements, working cycle, hant type threading machine, weaving process.

Introduction

In recent years, as a result of the implementation of comprehensive measures to develop the textile and sewing-knitting industry in our country, to support the investment and export activities of industry enterprises, 45 percent of the cotton fibre and yarn produced in the republic is recycled. is being developed, and the annual export potential of the industry has exceeded 3.2 billion dollars. At the same time, increased competition in world markets, and cost reduction due to the production of mixed products by foreign manufacturers require additional measures for the development of this sector. By the end of 2023, by the Ministry of Investments, Industry and Trade, the textile and sewing-knitting industry of the "Uztukimachiliksanoat" association will be supported by the state on a large scale. Information on increasing the level of utilization of production facilities from 65 percent to 81 percent, and filling 35 thousand vacancies was accepted for information.

Broad opportunities are being created for the provision of tax and customs concessions and preferences, as well as for attracting funds for the implementation of investment projects, aimed at further supporting the textile and sewing-knitting industry. Also, in order to ensure the implementation of the decision, starting from the harvest of 2023, based on accurate calculations regarding the introduction of an acceptable and transparent

mechanism for the payment of value-added tax on cotton raw materials for farms and cotton-textile clusters it is envisaged that additional proposals will be introduced [1]. The adoption and implementation of such decisions and decrees show that today the light industry is the most important part of the economy of our republic. Taking into account such conditions and opportunities, the following article is published by industry experts and scientists about the mechanisms of warp transfer and tensioning in the loom, which directly affects the quality of the fabric. analysis of scientific literature, articles and theses is presented. In particular, B.Kh. Boymuratov; A.D. Daminov's book "Weaving Technology" contains valuable information about the technical and technological requirements for the transmission and tensioning mechanisms, as well as the working processes of the transmission and tensioning mechanisms [2].

Also, the article "Opredelenie natyajeniya nitey na tkatskom stanke" [3] by Pavel Dimitreyevich Lastochkin, Akramov Abduvali Mamatkhanovich will be published in the October 2022 issue of the scientific journal "Central Asian Research Journal For Interdisciplinary Studies (CARJIS)". This article describes the effects of warp thread tension on the weaving process and product quality and describes the loom foundation operations necessary to ensure tension control continues smoothly. The article describes individual threads and their groups, as well as existing devices for fabric tension measurement. The article also describes the analysis of the efficiency of the devices, their advantages and disadvantages, taking into account the principle of operation of the voltage measuring devices.

O.A. Ortikov's candidate thesis on the topic "Design and production technology of clothing fabrics with specific characteristics" [4] within the framework of the fabric shearing report, determination of the shrinkage of each yarn by the number of yarn passes and given porosity taking into account the parameters of the structure of clothing fabrics were also developed.

At the same time, in the research, the scale system of the loom was improved, and the tension law was determined for the existing and improved weaving system.

In A.M. Akramov's candidate's thesis on "Optimization of the parameters of obtaining terry fabric on a loom" [5], the issue of "Creation of new types of terry cloth on a loom and optimization of parameters" was studied. Also, in the research work, a full board image of the fabric was developed for a new assortment of versatile shearing, and the hygroscopic properties of the fabric as a result of increasing the shearing coverage in the warp and weft directions among the samples. found to be 18% higher on the warp and 22% higher on the weft and, unlike existing instruments for determining the tension of the warp yarns on the loom, the micro-digital gauge is capable of measuring tension changes with high precision a special programmed measuring device consisting of transducers was created.

In H.Y. Rasulov's candidate's thesis on the research of thread tension in the production of shirting fabrics on shuttleless looms [6], the issue of optimizing the tension of warp and weft threads on weaving looms with a dwarf thrower, increasing machine productivity and improving the quality of produced shirting fabrics seen In the study, new systems for tensioning and transmission of warp threads were created on a shuttleless loom, and the laws of tension of warp and warp threads were determined in the created systems. Also, a mathematical model has been developed that represents the interrelationship between the tension of warp and weft yarns and thread breaks for shirt fabrics. As a result, based on the climatic conditions of the region, the development of shirt fabrics with a surface density not higher than 120 gr/m2 and the use of cooked yarns with low linear density without the process of making shirt fabrics in the preparation department release is proposed. In an important study, it was determined that the law of change of rope thread tension depends on the friction radius, friction angle, friction coefficient, singleness of the rope thread and the position of the compensator.

In O.A. Akhunbabayev's PhD thesis [7], theoretical and experimental research was conducted to develop fine fabrics on pneumo-rapier looms, as well as to standardize the process and achieve this goal. In the research conducted on the production of Avrli fabric, it has been proven that the change in the tension of the warp threads is less during the process of forming a humuz than during the compaction process, and the tension of the warp threads during the formation of the shed is different.

N.M. Sokeri, G.V. Shirova, O.V. Gubina, S.E.Chikunova[8] in their research work that it is necessary to minimize the tension of the thread during the weaving process because high thread tension with multi-period deformations of the threads during the fabric production process leads to a significant change of the thread. at the same time, they believed that it should provide the necessary conditions for the formation of the fabric and the smooth movement of the threads.

In the doctor's thesis of O.A. Akhunbabaev [9], an additional scale and a reduced diameter tensioning scale, the scale system of the STB type loom without a shuttle was created, which reduces the mass and inertia of the tensioning scale, reduces the breakage of the warp threads and affects the quality of the fabric. studied. As a result of scientific research, the researcher obtained the general deformation work formula of the warp yarn as a result of glueing using the looms on the loom with additional scales, based on the obtained formula, the method of determining the length of the deformable warp yarns on the loom spool and on the loom A new method of determining the tension of fabric production has been created.

In the study of S.D. Nikolaev [10], the tension of the warp and weft threads was studied in order to obtain the given structure of the fabric in the weaving loom and to keep it in the fabric.

N.A. Avilochkina studied the tension of the threads in the main periods of fabric formation in the production of fabric in the work [11] dedicated to the study of the tension of warp and loom threads.

V.A. Tyagunov, E.Y. Starinets [12] studied the changes in the tension of warp yarns on shuttleless looms manufactured by DORNIER. According to the researchers' conclusions, the amount of tension of the threads being woven on the looms and its change in the first zone is minimal. In the process of weaving, the amount of tension of thin threads is higher in the second zone than in the first one due to the speed of throwing the thread to the hoop by the rapiers of the loom. It is based on the fact that the highest voltage level is in the third zone, due to the action of several braking devices.

The length of the thread coming out of the weaving reel should correspond to the length of the fabric formed from it. The length of the weft thread passed from the weaving reel depends on the shrinkage of the fabric on the weft and the density of the fabric on the warp.

Technical and technological requirements for transmission and tensioning mechanisms:

- keeping the thread tension constant as the diameter of the winding on the weaving reel decreases,
- during the process, maintaining the stability of the clamping tension from one working cycle to another;
- control of internal cycle tension;
- maintaining warp tension and fabric edge condition in order to reduce (treadmill) defects formed during short-term walking-stopping;
- as the winding diameter decreases, constant maintenance of the machine's throttling line;
- delivering a specific length of thread to the area of tissue formation [13].

As the thread wears out on the weaving reel, the winding diameter decreases, as a result of which the tension can change and affect the quality of the fabric. If the tension increases, the density of the threads in the fabric increases, if the tension decreases, the structure and composition of the fabric may be uneven. The transmission and tensioning mechanism of the thread performs the task of transferring the threads of the thread in a certain tension during the formation of the tissue. According to the principle of operation, these mechanisms are divided into body adjusters and body brakes [14].

Warp adjusters on looms are divided into positive and negative types.

Positive warp adjuster

The amount of yarn transfer is increased independently of the yarn tension and is constant Δl_o=const. Such adjusters are used in the production of fluffy and feather fabrics.

Negative warp adjuster

In the case of negative thread adjusters, the amount of thread transfer from the weaving reel directly depends on the tension of the thread. If the tension on the warp increases - more, if it decreases - less, the thread on the warp is released.

Therefore, the tension of the warp thread in the negative thread adjusters is maintained at the same level by changing the length of the thread protruding from the weaving reel.

The element that senses the change in the tension of the threads of the body is called the scale, and it is kinematically connected to the mechanism that rotates the weaving reel.

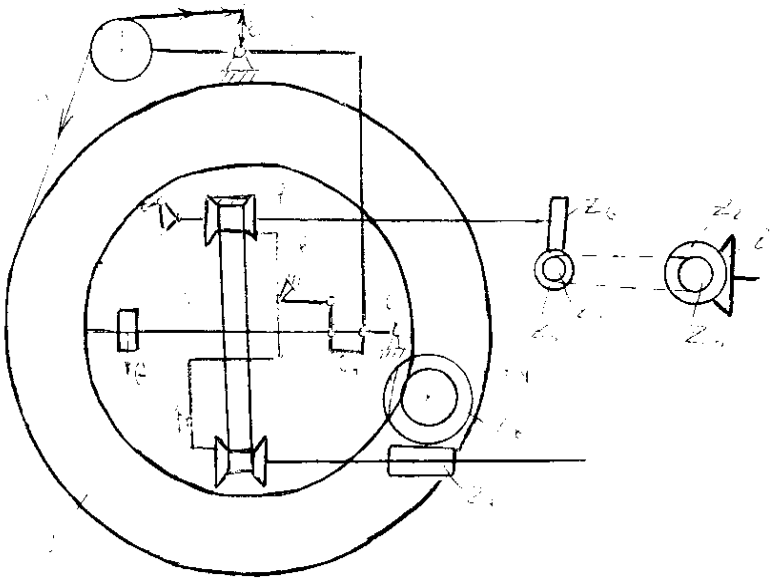
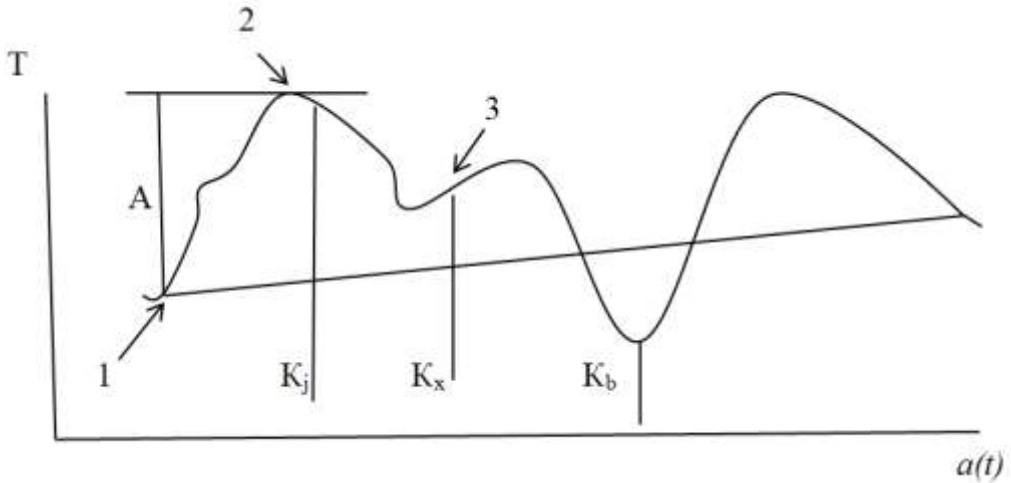


Figure 1. Hant-type warp adjuster.

The variator warp adjuster (Hant type) is used in STB, TMM and ATPRV-160 machines [15].

The tension of the threads is doubled from the bobbin to the edge of the fabric. In addition, the tension of the tanda changes during the working cycle of the machine.



1 - tension in the warp during the middle state;
2 - warp tension during compaction;
3 - tension in the warp during stagnation;

A - the amplitude of the change in body tension.

Figure 3. Changes in warp tension during the working cycle of the machine.

The smaller the amplitude of the change in warp tension, the better it is for the technological process (disruption is reduced) [16].

In STB, ATPR looms without a shuttle, friction thread adjusters are installed, and these adjusters transmit thread length depending on the thread tension, that is, when the tension decreases, the length of the transmitted thread is reduced or stopped altogether [17].

During the operation of the loom, the warp adjuster can be damaged, which causes the appearance of various defects in the fabric. The following defects appear in the fabric due to incorrect operation of the warp adjuster:

- An increase in the tension of the thread;
- Falling of various impurities between the teeth of the drive and roller gears;
- Jamming of the weaving reel axis in the bearings;
- The penetration of gears into the deep brickwork;
- Such as the loosening of the bricks of some parts [18-23].

Conclusion

Today, the textile and knitting industry is one of the most important sectors in every industrialized country. For this reason, every developed and developing country is paying a lot of attention to light industry. In particular, improving the quality of products and producing competitive products in the international market remains the most important task. In this case, the mechanisms that control the warp threads and fabric tension in the process of weaving fabrics are an important factor in improving the quality indicators of finished products. The reason is that the activity of mechanisms that control warp and fabric tension has a direct impact on the quality of the product. In this case, the tension of the warp and weft threads is considered one of the most important parameters acting in the direction of the longitudinal axis of the thread for the formation of the power fabric. During one cycle, the warp thread moves back and forth along the loom, passing through the eyelets of the gula, so it is important to study the types of effects of warp tension. Usually, the thread tension changes between the weaving processes, such as from the bobbin to the loom, from the loom to the needle teeth, from the needle teeth to the weft, and from the weft to the weft. Variations in thread tension are due to incorrect threading. Through scaling, the surface dimensions and performance are occasionally seen in tissue. Taking into account the above-mentioned opinions and comments of experts, the tension in the body during the weaving process, and mechanisms for adjusting the tension in the body and tissue are important factors in the quality production of the product. At the same time, due to insufficient scientific research on this topic, continuing the research work on this topic may help to improve the quality of the product.

References:

1. Decree of the President of the Republic of Uzbekistan "On measures to support the activities of cotton-textile clusters, fundamentally reform the textile and sewing-knitting industry, and further increase the export potential of the sector" PF number 2 10.01.2023.
2. B.H. Boymuratov, A.D. Daminov. (2016). Weaving technology. *Science and Technology*. Tashkent, 203.
3. Акрамов, А. М., & Ласточкин, П. Д. (2022). Определение натяжения нитей на ткацком станке. *Central Asian Research Journal for Interdisciplinary Studies (CARJIS)*, *2*(10), 34-40.
4. O.A.Artykov. Technology of design and production of special clothing fabrics.
5. A.M.Akramov. Optimization of the parameters of obtaining a turban fabric on a loom.
6. H.Y.Rasulov. Investigation of thread tension in the production of shirt fabrics on shuttleless looms.

7. Ахунбабаев, О. А. (1986). *Совершенствование процесса выработки авровой ткани из натурального шелка на станках АТПР* (Doctoral dissertation, Дис…. канд. техн. наук).
8. Сокерин.Н.М., Широва.Г.В., Губина.О.В., Чикунова С.Э. (2013). Об изменении натяжения нитей основы в КЗЛ станка. *Тезисы докладов. Кострома: Изд- во Костром. гос. технол. ун-та.* с. 92.
9. Николаев.С.Д., Ковалева.О.В., Ликучева.А.А. (2004). Исследование напряженно-деформированного состояния нитей на ткатском станке с исползованием тепловизора. *Изв. вузов. Технол. текстил. пром-сти*., Н3, с. 95-105.
10. Николаев С.Д. (1977). Исследование процесса формирования хлопчатобумажных тканей с продолными полосами различного переплетения на бесчелночных ткатских станках СТБ. Дисс. ... к.т.н. М.
11. Авилочкина Н.А. (2011). Исследование натяжения нитей основы и утка в изготовлении тканей из котонированного лна. Тезисы докладов внутривузовской научной конференсии, М.: Изд-во МГТУ., с. 24-45.
12. В.А.Тягунов., Старинетс.Э.Й (2012). Исследование законов изменения натяжения уточной нити за цикл работы на ткатском станке дорниер. Вестник КГТУ № 2(29)-Кострома, 29-30 с.
13. Mahbubul Haque. (2017). Warp tension on the loom and its effect on the fabric property. *Journal of itet*.
14. В.А. Гордеев. (1984). Ткачество. М.
15. E.SH.Alimboyev, P.S.Siddikov, B.K.Hasanov, S.S.Rahimkhujayev, M.R.Yunushujayeva, D.D. Kadirova. (2007). Special technology and equipment of weaving. T:, *Ilm Ziyo,* 155-157.
16. E.Sh.Olimboev, Davirov Sh.N. (2002). Products of Uzbek enterprises and their production technology. T.
17. Мартынова, А. А., Слостина, Г. Л., & Власова, Н. А. (1999). Строение и проектирование тканей.
18. S.D.Nikolaev, R.I. Sumarukova. (2005). Theory and technology of yarn preparation processes for weaving. Tashkent.
19. Dolimov, A., Izatillaev, M., Abdulkhakova, S., Aliyev, B., & Sobirova, M. (2023, June). Analysis of capillary properties of terry fabric. In *AIP Conference Proceedings* (Vol. 2789, No. 1). AIP Publishing. https://doi.org/10.1063/5.0145434
20. Рахимходжаев, С., Расулов, Х., Изатиллаев, М., & Адхамжонов, Ш. (2019). Аналитические исследования натяжения нитей основы за цикл работы станка. *ББК 60 С 56*, 325.
21. Aripjanovich, S. R. Influence of Carding Machine Productivity on Yarn Quality. *International Journal on Integrated Education*, *3*(8), 191-194.
22. Izatillayev, M. M., & Korabayev, S. A. (2020). Experimental studies of shirt tissue structure. *The American Journal of Applied sciences*, *2*(11).
23. Musohon, I. M., Shuxratjonovich, R. B., Avaz, J. G., & Baxromjon, B. M. (2021). Tools to determine the tension of selected yarns on knitting machines by experiment. *Збірник наукових праць ЛОГОС*.