

same time, the content of seed cotton in the waste of the new regenerator will be no more than 2-4%, which corresponds to a similar indicator of a serial regenerator of RX, and the contamination of the regenerated flyings should not exceed 10-15% [7].

On the basis of the developed scheme and above selected parameters of working parts, drawings of a pilot industrial sample of a new regenerator of seed cotton from wastes of cleaning equipment have been prepared.

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UDC 677.21.021

IMPROVED TECHNOLOGY FOR HUMIDIFYING OF COTTON PRODUCTS

Gulyaev R.A., Nazirov R.R., Mardonov B.M., Lugachev A.E., rgsifat@gmail.com
«Pakhtasanoat Ilmiy Markazi» JSC, Tashkent institute of textile and light industry,
Tashkent, Uzbekistan

Key words: seed cotton, cotton fiber, humidifier, moisture, humidification, cotton bale, press, gin, cleaner.

Annotation. The article considers the problems of improving the quality of cotton fiber by developing a new design of humidifiers for seed cotton and cotton fiber which provide more efficient and qualitative humidification of cotton materials.

Cotton fiber is one of the most important strategic commodities in the world trade. According to the International Cotton Advisory Committee (ICAC), world production of cotton in the season 2015/16 reached 26.2 million tons [1].

The analysis revealed that cotton fiber produced by cotton industry of the republic has an average moisture content of about 5.0 %, indicating the shortcomings of existing technology and the necessity of development of new and effective methods of humidification of the fibrous material and devices for their implementation [2].

In the process of primary processing of cotton, the essential importance belongs to technological moisture of fiber before pressing process. In accordance with state standards O'z DSt 604:2016 "Cotton fiber. Technical specifications" [3] and production schedules of primary processing of seed cotton PDI 17-2017 [4] cotton fiber before pressing should be moisturized to 7.5-8.5%. Technological operation of fiber moistening before its pressing to the above given rate provides optimal structural and mechanical properties of cotton fiber. After moistening fiber becomes less elastic and more susceptible to the mechanical influence, reduced tensile force acting on the strapping belt, improved presentation of fiber, static electricity on the fiber is neutralized, volume density and weight of bales increase, overall dimensions reduce. As a result reduction of energy consumption of pressing equipment, saving packaging materials, prevention of belt breaking and bale repressing, reduce transport costs, the prices of fiber, the exclusion of price discounts (because of low humidity moisture) can be achieved.

The research results of domestic and foreign scientists emphasize the importance of ensuring the required technological parameters of moisture content of seed cotton, cotton fiber at each stage of the cotton primary processing. These previous findings suggest that ginning of over-dried cotton (5.0 %) leads to a shortening of the length of the fiber due to the increase of mechanical damage, the formation of defects. Seed cotton ginning with high moisture content (over 8.5 %) reduces the gin performance, increases mechanical damage of seeds and leads to the formation of combined defects.

Cotton humidifier in the form of humidification chamber prompted to be installed on an inclined unloading tray of cleaning machine UHK (1HK) [5]. The principle of operation of the humidifier is based on the warm-humid treatment of seed cotton coming out of the machine UHK (1HK) by the humidification agent, having high moisture content (relative humidity of about 85-90 %) and the temperature (about 70 ° C). The supply of humidification agent to the cotton flow, moving along the inclined unloading tray, to be carried out above the conveying surface. For this purpose, the surface of the tray itself, in order to allow the passage of humidification agent is made in the form of louvre grid. In this case, a thin layer of seed cotton, moving on the surface of the unloading tray, will be wrapped by the steam of the humidification agent which is being discharged through the slots of the sheets forming a louvered grid. In order to improve efficiency of heat-mass transfer processes, and in particular, to ensure the aerodynamic interaction of humidification agent with cotton flies, it was suggested to install a diffuser at the top of the humidification chamber, conjugated with pneumatic system for sucking of the used humidification agent.

During the experimental studies the optimal moisture parameters of seed cotton before ginning were identified, which ensure preservation of the natural properties of the material and an increased fiber output [6].

Several variants of the device for humidification of seed cotton UHS, providing humidification of thin and loosened cotton layer, leaving the UHK (1HK) by warm and moist humidification agent have been developed on the basis of the analytical and theoretical studies [7].

The patents of the Republic of Uzbekistan on useful model UZ №FAP 00800 and UZ №FAP 00957 "Device for humidification of seed cotton" for the proposed methods and devices for humidifying of seed cotton before ginning, have been received [8].

Qualification testing of experimental-industrial pilot sample of the device for humidification of seed cotton UHS in conjunction with the generator of humidification agent EBG, conducted on Chinaz cotton ginnery in Tashkent region, have shown that the device is able to provide the seed cotton moisture increase up to 0.5 %.

Evaluation of the quality parameters of cotton fiber produced with different levels of moisture content of seed cotton, showed that such characteristics as micronaire, maturity, reflectance degree, yellowness of cotton fibers do not tend to change depending on the seed cotton moisture content and remain virtually constant. However, some significant effect of seed cotton moisture content on such characteristics as upper half mean length, length uniformity was revealed.

So, the upper half mean length of fiber obtained by ginning of seed cotton with moisture content 7.64 % was 0.005 inches longer than of fiber, obtained by ginning of seed cotton with moisture content 7.13 %. Changing of the seed cotton moisture content only to 0.5 % ensured preservation of modal weight length for 0.2 mm, the staple length for 0.21 mm, the mean length for 0.82 mm. Short fiber index in the samples of fiber, obtained after ginning of non-humidified seed cotton, was 2.13 % higher than in the humidified seed cotton.

Experimental studies of influence of different initial moisture content of seed cotton before ginning to the change of the parameters of quality and cotton fiber output have been conducted for the purposes of scientific substantiation of the optimal technological moisture of seed cotton before ginning, in relation to the existing seed varieties and modern technological equipment. As a result of ginning of seed cotton with moisture of 3.8 %, 6.5 %, 8.1 %, 9.7 % and 10.7 % it was determined that the highest fiber output was fixed at 8,1 % moisture content. During the tests a significant effect of seed cotton moisture on such characteristics as strength, upper half mean length, short fiber index, length uniformity, was revealed.

Several variants of the device for humidification a cotton fiber before pressing UVR have been developed on the basis of the results of the analytical and theoretical studies.

For the proposed methods and devices for humidification of fiber prior to pressing, the patents of the Republic of Uzbekistan (UZ №IAP 02731, UZ №FAP 00390, utility model application for the patent of the Republic of Uzbekistan UZ №FAP 20150044) were received [9].

The State acceptance tests of the prototype device UVR, carried out on Buka cotton ginnery of Tashkent region, showed its efficiency and functionality.

Humidification of cotton fiber with an initial moisture content of 8.28 % was carried out with a water flow at the rate of 30 and 45 l / h. Increase of the moisture in the first case amounted to 0.63 %. The average moisture content of fiber was 8.91 % and the standard deviation – 0.25 %. Gain of fiber moisture from the water flow rate of 45 l/h was 1.11 %. The average value of moisture content – 9.38 %, standard deviation – 0.19 %. The obtained results are characterized by high uniformity of fiber's humidification by volume.

For the scientific justification of the proposed options and of the moisture range limit, experimental studies were carried out in order to reveal the effect of different initial moisture fiber to the quality parameters change during prolonged storage. Quality indices of cotton fiber samples, artificially humidified to 8.6 %, 10.3 %, 13.8 %, 17.5 %, were compared with the original quality of cotton fiber moisture content of 7.3 %.

Results of studies in the area of humidification of seed cotton and cotton fiber have allowed to create the new device for humidification of seed cotton before ginning and new apparatus for humidification of cotton fiber before pressing. Both devices received patents of the Republic of Uzbekistan for useful models.

Humidification of seed cotton before ginning and cotton fiber before pressing provided the net gain of moisture up to 1.6 %, and the corresponding weight gain of 7-8 kg for bale. Applied humidification technology does not deteriorate the fiber quality parameters, while avoiding moistening of fiber greater than 8.5 %.

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UDC 677.072.39

TECHNOLOGY OF PRODUCING THICK-AND-THIN FANCY YARN ON FLYER FRAME MACHINE

ТЕХНОЛОГИЯ ПОЛУЧЕНИЯ ПЕРЕСЛЕЖИСТОЙ ФАСОННОЙ ПРЯЖИ НА КОЛЬЦЕВОЙ ПРЯДИЛЬНОЙ МАШИНЕ

*Hnidzenka A.K., postgraduate student, andriy-5199029@mail.ru,
Miadvecki S.S., associate professor*

Vitebsk State Technological University, Vitebsk, Republic of Belarus

Гниденко А.К., асп., Медвецкий С.С., доц.

*Витебский государственный технологический университет,
г. Витебск, Республика Беларусь*

Key words: fancy yarn, structural effects, thickening, thinning, volume effect, controlled speed mode control.

Ключевые слова. Фасонная пряжа, структурные эффекты, утолщение, утонение, эффект объемности, контролируемое управление скоростным режимом.

Abstract. The article considers a new technology of producing thick-and-thin fancy yarn on flyer frame machine. One of the most interesting and promising directions in the production of fancy yarn is the technology of thick-and-thin yarn. A thick-and-thin is the name of yarn with periodic or accidentally alternating thickening and thinning. The technology makes it possible to get a variety of color and structural effects.

Аннотация. В статье рассмотрена новая технология получения переслежистой фасонной пряжи на кольцевой прядильной машине. Одним из наиболее интересных и перспективных направлений в производстве фасонной пряжи является технология переслежистой пряжи. Переслежистой называется пряжа с периодически или случайно чередующимися утолщениями