

DEVELOPMENT OF EFFECTIVE TECHNOLOGY AND ELEMENT FOR A SAW GIN FEEDER

R. Sh. Sulaymonov

Research Institute of Fiber Crops.

Z.J. Omonov

Tashkent State Technical University

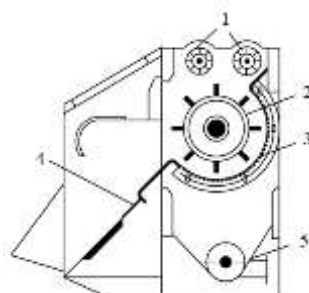
S.K. Abdukhamidov

Institute of Mechanics and Seismic Stability of Structures of the Academy of
Sciences of the Republic of Uzbekistan

Abstract. The feeder for effective cleaning and ginning of cotton from small trash impurities in the saw gin has been improved with a grate of a new design. As a result, the cleaning efficiency of the feeder when cleaning cotton of grades I and III increased by an average of 2.4 (abs) %, fiber quality by 0.46 (abs) % and 0.22 (abs) % compared to the feeder with a mesh surface, and fiber of grades I and III “Superior” class was produced according to the state standard UzSst 604:2016.

Key words: Feeder, saw gin drum, mesh surface, grate, cotton, fiber, seed, dirt, cleaning efficiency, productivity, quality.

Introduction. As a result of theoretical and practical research conducted for the effective cleaning of cotton from small trash impurities before the ginning process, a diagram of a grate of a new design for the saw gin feeder was developed (Fig. 1) and its rational parameters were determined [1]. Based on the prepared drawings of the grate, an experimental sample was prepared and installed on the feeder of a 30-saw gin in the technological laboratory of JSC “Paxtasanoate Science Center” and comparative-experimental work was carried out with a feeder with a mesh surface (Fig. 2). Experimental work was carried out by alternating the installation of a mesh surface and a grate with a long arc length of the proposed cleaning zone on the gin feeder. The research work was carried out on the mesh surface with a spiked drum on the feeder, the grate with a spiked drum in the range of 15-18 mm, recorded in the technical characteristics of the saw gin [2]. Experimental work was carried out on cotton of selection C-6524 of grades I and III of class 2. In this case, the moisture content of cotton fed to the saw gin feeder averaged 7.8% and 10.2% by variety, and the contamination averaged 1.66% and 1.72% [3, 4].



**Figure 1. 30-saw with a grate with
an extended cleaning arc length
gin feeder diagram**

1-feeding rollers, 2-spike drum,
3-grate, 4-drain, 5-waste auger

When cleaning first-grade, second-class cotton of the C-6524 selection with 7.8% moisture content and 1.66% contamination using the proposed grate feeder with a spiked drum at a distance of 15-18 mm from the grate, the contamination level of the cleaned cotton averaged 1.38-1.42%. The quality of the cleaned cotton improved by an average of 0.04-0.03 (abs)% compared to the cotton cleaned using the existing mesh surface feeder (Fig. 3). The cleaning efficiency of the feeder during cotton cleaning averaged 16.7-14.5% with intermediate distances varying from 15 mm to 18 mm, which is on average 2.2-1.8 (abs)% higher than the cleaning efficiency of the mesh surface feeder selected for comparison.



Figure 2. New-design grate

The fiber contamination after ginning averaged 3.15-3.11%, and the fiber quality increased by an average of 0.06 (abs)% compared to fiber produced from gin with an existing mesh surface. When ginning cotton, the gin's productivity averaged 328-340 kg/hour, which is 13-16 kg/hour higher than the existing mesh surface gin. Then, after cleaning the fiber in a two-drum fiber cleaner of the 5VP brand after ginning, the fiber contamination averaged 1.86% and 1.91% respectively, and the quality of fiber obtained from gin with an existing mesh surface improved by an average of 0.46 (abs) % and 0.37 (abs)% compared to the fiber obtained from cleaning in the fiber cleaner, and according to the state standard UzSst 604:2016, it constituted class I grade "Superior".

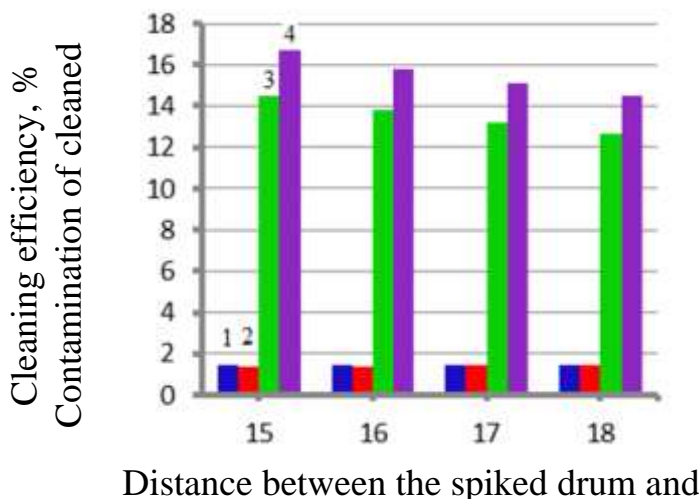


Figure 3. Relationship between the distance of the spiked drum from the separator and the contamination level of cotton after cleaning, as well as the cleaning efficiency of the feeder for S-6524 selection grade I cotton in the feeder.

1, 3 on the mesh surface, 2, 4 on the grate panel

the separator, mm

Then the experimental work was carried out on cotton of selection C-6524 III grade 2 class. At the same time, the moisture content of the raw cotton of the 2nd class of grade III, fed into the gin feeder-cleaner, averaged 10.2%, contamination-1.72% and seed damage in the raw cotton composition-2.0% [5].

In a 30-saw gin with a mesh surface of the existing design, when cleaning the mesh surface with a spiked drum on a feeder-cleaner of the 2nd class of cotton of selection III grade C-6524, at a distance of 15-18 mm, the contamination of the cleaned cotton averaged 1.36-1.39%, and the degree of seed damage in the cleaned cotton was 2.17-2.14%. In this case, the cleaning efficiency of the feeder-cleaner averaged 20.9-19.2% with the change in intermediate distances at the above-mentioned values. When ginning cotton, the degree of seed fuzziness after ginning was practically the same with a change in the mesh surface of the spiked drum from 15 mm to 18 mm and averaged 11.2%. In this case, the degree of seed damage averaged 3.44-3.21%. The fiber contamination after ginning averaged 3.51-3.63%. When ginning cotton, the gin's productivity changed from an average of 278 kg/hour to 289 kg/hour. When cleaning the fiber produced from gin in a two-drum 5VP fiber cleaner installed after gin, the fiber contamination averaged 3.12-3.16%, and the quality indicator of the produced fiber was III grade "Good" class according to the state standard UzSst 604:2016 [6].

The degree of contamination of the cleaned cotton was on average 1.32-1.35%, and the quality of the cotton was improved by an average of 0.04 (abs) % compared to the quality of the cleaned cotton on a feeder with an existing mesh surface, when cleaning cotton of the 2nd class of grade III of selection C-6524 with a moisture content of 10.2% and contamination of 1.72% with a spiked drum on the feeder of a 30-saw gin at a distance of 15-18 mm (Fig. 4).

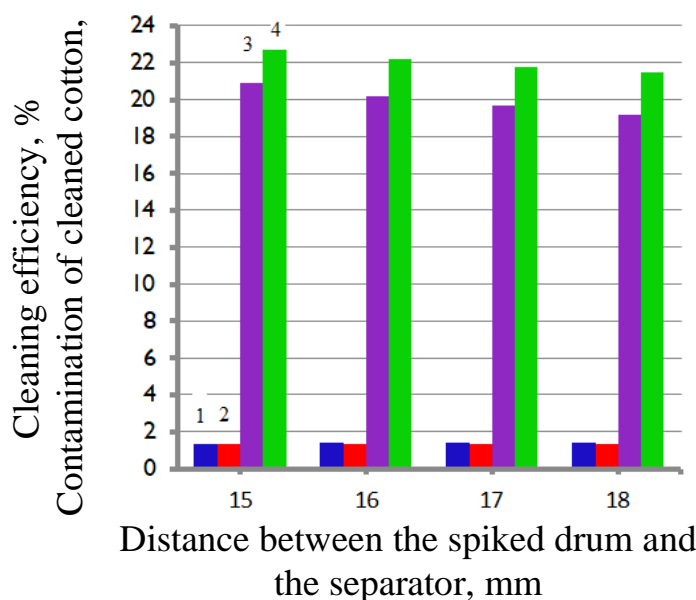


Figure 4. Dependence of cotton contamination after cleaning and feeder cleaning efficiency on the distance between the spiked drum and separator in the feeder for S-6524 selection grade III cotton.

1, 3 on the mesh surface, 2, 4 on the grate panel

The cleaning efficiency of the feeder during cotton cleaning averaged 22.7-21.5% with a change in intermediate distances from 15 mm to 18 mm, which is on average 2.4-2.3

(abs)% higher than the cleaning efficiency of the existing feeder with a mesh surface selected for comparison. The fiber contamination after ginning averaged 3.37-3.46%, which is on average 0.14-0.17 (abs)% less than the fiber contamination produced from gin with an existing mesh surface feeder. When ginning cotton, the gin productivity varied from an average of 290 kg/hour to 303 kg/hour, which is on average 12-14 kg/hour higher than the existing gin with a mesh surface.

When cleaning the fiber after ginning on a two-drum cleaner, the contamination of the cleaned fiber averaged 2.9% and 2.96%, and the quality of fiber obtained from gin with an existing mesh surface improved by an average of 0.22-0.2 (abs)% compared to the fiber obtained from cleaning on a fiber cleaner, and according to the state standard UzSst 604:2016 constituted grade III "Superior" class [6].

As a result of the conducted research work, the improvement of the saw gin feeder with a grate, accelerating the separation of small impurities from cotton, implemented an effective technology for cleaning and ginning cotton, and also improved the quality of the produced fiber.

REFERENCES

- [1]. Sulaymonov R.Sh., Omonov Z.J., Dusiyorov J.J. Arrali jin ta'minlagich-tozalagichini samaradorligi bo'yicha izlanishlar. O'zbekiston kompozitsion materiallar ilmiy-texnikaviy va amaliy jurnali. №4, Toshkent. 2023. 187-190 b.
- [2]. Э.Т. Максудов, А.Н. Нуралиев. Справочник по первичной обработке хлопка. Книга 1. Ташкент- «Меҳнат»- 1994- с. 257-260.
- [3]. Sulaymonov R.Sh., Omonov Z.J., Ismatov M.N., O'ngboyev A.M., Saytov U.A. The effectiveness of the cotton cleaning system on foreign saw gins. AMERICAN Journal of Engineering, Mechanics and Architecture Volume 2, Issue 6, 2024 ISSN (E): 2993-2637. www.grnjournal.us.
- [4]. O'zDst 644:2006. Пахта. Намликни аниқлаш усуллари. Тошкент, 2006.- 17 б.
- [5]. O'zDst 592-2016. Пахтани ифлослигини аниқлаш усуллари. Тошкент, 2008, 12 б.
- [6]. O'zDst 604:2016. Пахта толаси. Нуксонлар ва ифлос аралашмалар массавий улушини аниқлаш усуллари. Тошкент, 2016.- 19 б.
- [7]. Sulaymonov R., Omonov Z., Meliboyev Ya., Khasanov O., Ma'murjonov D. Research on the Efficiency of a Saw Gin Supplier-Cleaner. AIP Conf. Proc. 3244, 060003 (2024) <https://doi.org/10.1063/5.0242030>. Research article. November 27, 2024, pp. 060003-1-6.
- [8]. Sulaymonov R.Sh., Omonov Z.J., Ismatov M.N. Paxtani mayda iflosliklardan tozalashning innovation texnologiyasi. Innovation texnika va texnologiyalarning qishloq xo'jaligi oziq-ovqat tarmog'idagi muammo va istiqbollari // IV Xalqaro ilmiy-texnik anjuman to'plami. –Toshkent. ToshDTU, 2024. -482 b.
- [9]. Sulaymonov R.Sh., Irgashev B.A., Omonov Z.J. Effective cleaning of cotton in a saw gin. Technical science and innovation №1/2025 ISSN: 2181-0400 E-ISSN: 2181-1180 <https://btstu.researchcommons.org/journal>

- [10]. Omonov Z.J., Yunusova M.U., Xurramov D.X. Исследование влияния чистящего средства на эффективность очистки и эффективность джина. The multidisciplinary journal of science and technology Vol. 5 Issue 4 | ISSN: 2582-4686 SJIF 2021-3.261, SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 9.948 / 2024 <https://mjstjournal.com/index.php/mjst/article/view/3291>
- [11]. Sulaymonov R. Sh., Omonov Z.J., Yunusova M.U., Dusiyorov J.J. Mashinada terilgan paxtani arrali jinlarda mayda iflosliklardan tozalash jarayonini o'rganish. Development of science. Ilmiy jurnal. 2025/3 volume 1. ISSN 3030-3907. www.devos.uz

Annotatsiya. Paxtani arrali jinda mayda iflosliklardan samarali tozalash va jinlash uchun ta'minlagich yangi konstruksiyali kolosnikli panjara bilan takomillashtirildi. Natijada I va III navli paxtani tozalashda ta'minlagichni tozalash samaradorligi to'rt yuzali ta'minlagichga qaraganda o'rtacha 2,4 (abs)% ga, tolani sifati 0,46 (abs)% va 0,22 (abs)% ga oshdi hamda O'zDst 604:2016 davlat standarti bo'yicha I va III navli "Oliy" sinfga mansub tola ishlab chiqarildi.

Tayanch so'zlar: Ta'minlagich, arrali jinqoziqli baraban, to'rt yuzali, kolosnikli panjara, paxta, tola, chigit, ifloslik, tozalash samaradorlik, ish unumdorlik, sifat.

Аннотация. Для эффективной очистки и обеззараживания хлопка от мелких примесей в пилообразном Джине поставщик был усовершенствован новой конструкцией колосниковой решетки. В результате эффективность очистки поставщика при очистке хлопка I и III сортов увеличилась в среднем на 2,4 (abs)% по сравнению с поставщиком с сетчатой поверхностью, качество волокна на 0,46 (abs)% и 0,22 (abs)% соответственно, а также произведено волокно I и III сортов "высшего" класса по государственному стандарту УзДст 604:2016.

Ключевые слова: Поставщик, пила, джин барабан, сетчатая поверхность, колосниковая решетка, хлопок, волокно, дерн, грязь, уборка эффективность, производительность труда, качество.