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IMPROVEMENT OF MECHANISMS OF EQUIPMENT FOR CLEANING WOOL FIBERS FROM IMPURITIES AND VARIOUS FOREIGN MATTERS

Toshtemirov Kosim Abdulkhayevich
Senior Lecturer, Department of Light Industry Technology and Equipment, Fergana State Technical University, Fergana, Uzbekistan
E-mail: toshtemirov@mail.ru

Abstract. This article discusses the improvement of the structural and kinematic features of technological equipment used for cleaning wool fibers from impurities and various foreign matters. At the primary processing stage of wool raw material, the effective removal of dust, plant residues, mineral particles and other foreign components directly affects the quality of the final product and the stability of subsequent technological processes. The article analyzes the operating principle of existing cleaning machines, as well as the technological functions of the drum, belt, springs and transmission mechanisms. In addition, the study proposes directions for increasing cleaning efficiency, reducing energy consumption, optimizing mechanical action on the fibrous mass and automating control processes. The results may be used to select optimal operating modes for wool fiber processing equipment, improve its structural elements and increase production efficiency.

Keywords: wool fiber, cleaning equipment, drum, impurity, foreign matter, belt, spring, kinematic scheme, automation, technological parameter.

Annotatsiya. Mazkur maqolada jun tolalarini ifloslik va turli aralashmalardan tozalash jarayonida qo‘llaniladigan texnologik uskunalarning konstruktiv va kinematik xususiyatlarini takomillashtirish masalalari yoritilgan. Jun xomashyosini dastlabki ishlov berish bosqichida tolalar tarkibidagi chang, o‘simlik qoldiqlari, mineral aralashmalar va boshqa begona komponentlarni samarali ajratish tayyor mahsulot sifati hamda keyingi texnologik jarayonlarning barqarorligiga bevosita ta’sir ko‘rsatadi. Maqolada mavjud tozalash uskunalarining ishlash prinsipi, baraban, tasma, prujina va uzatish mexanizmlarining texnologik vazifalari tahlil qilinadi. Shuningdek, tozalash jarayonining samaradorligini oshirish, energiya sarfini kamaytirish, mexanik ta’sirni maqbullashtirish va boshqaruv jarayonlarini avtomatlashtirish bo‘yicha takliflar ishlab chiqiladi. Tadqiqot natijalari jun tolalarini qayta ishlash uskunalarining optimal rejimlarini tanlash, konstruktiv elementlarini takomillashtirish va ishlab chiqarish samaradorligini oshirishga xizmat qiladi.

Kalit so‘zlar: jun tolasi, tozalash uskunasi, baraban, ifloslik, aralashma, tasma, prujina, kinematik sxema, avtomatlashtirish, texnologik parametr.

Аннотация. В данной статье рассмотрены вопросы совершенствования конструктивных и кинематических особенностей технологического

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оборудования, применяемого для очистки шерстяных волокон от загрязнений и различных примесей. На стадии первичной обработки шерстяного сырья эффективное удаление пыли, растительных остатков, минеральных включений и других посторонних компонентов оказывает непосредственное влияние на качество готовой продукции и стабильность последующих технологических процессов. В статье проанализированы принцип работы существующих очистительных машин, а также технологические функции барабана, ленты, пружин и передаточных механизмов. Кроме того, предложены направления повышения эффективности очистки, снижения энергозатрат, оптимизации механического воздействия на волокнистую массу и автоматизации процессов управления. Полученные результаты могут быть использованы при выборе оптимальных режимов работы оборудования для переработки шерстяных волокон, совершенствовании его конструктивных элементов и повышении производственной эффективности.

Ключевые слова: шерстяное волокно, очистительное оборудование, барабан, загрязнение, примесь, лента, пружина, кинематическая схема, автоматизация, технологический параметр.

INTRODUCTION.

In global practice, the primary processing of wool fibres, their cleaning from impurities and various foreign materials, and the production of high-quality textile products are regarded as one of the important scientific and practical areas of light industry. Wool is a fibrous raw material of natural origin and may contain grease and suint, dust, sand and soil particles, plant residues, mineral particles and other foreign impurities [1; 2]. The effective separation of these impurities has a direct effect on the stability of subsequent opening, washing, carding, spinning and fabric manufacturing processes, as well as on the quality of the final product [3].

At the international level, modern machinery and technologies for wool preparation and processing are widely used in Australia, the United States, China, Argentina, Iran, Russia, Kazakhstan and European countries. In international practice, particular attention is paid to improving cleaning efficiency during the primary processing of wool, preventing excessive mechanical damage to the fibre, reducing energy consumption, ensuring the rational use of water and chemical reagents, and automating production processes [4; 5]. This is because the preservation of wool fibre cleanliness, length, elasticity and physico-mechanical properties is one of the key factors determining the competitiveness and economic efficiency of the finished product [6].

Wool fibres are usually cleaned by mechanical and chemical methods. In mechanical cleaning, the fibrous mass is opened, loosened and separated from

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coarse and fine foreign impurities under the action of working organs. Chemical cleaning, including washing and carbonising processes, is aimed at reducing grease and suint, adhesive contaminants and certain plant residues [2]. However, due to the high consumption of water, energy and reagents in chemical treatment processes, the generation of wastewater and the potential adverse effects on fibre properties, increasing the efficiency of the mechanical cleaning stage is of considerable importance [4; 5].

In some wool-processing enterprises in our country, 2BT-type opening and cleaning machines are currently used. This equipment is designed to feed the wool mass uniformly, open and loosen it, and separate various impurities contained in it. Scientific and technical sources indicate that the structural design of working organs, drum motion, transmission mechanisms, compression force and technological clearances in machines for the mechanical processing of wool fibres have a significant influence on cleaning efficiency [6; 7]. Therefore, there is a need to improve the structural and kinematic parameters of the feeding mechanism, drum-type working organs, transmission elements and spring-loaded compression devices in existing machines.

In the existing 2BT opening and cleaning unit, unwashed wool fibre is fed into the working chamber by means of a feed belt. The feed rollers compress the fibrous mass and direct it into the opening and cleaning zone. The wool mass is then opened under the action of drum-type working organs, and foreign impurities contained in it are separated. However, during the process, uneven fibre feeding, improper selection of the distance between working organs, excessive or insufficient mechanical action may negatively affect cleaning quality. In particular, determining the optimal ratio between the feed belt speed, roller compression force, drum rotation mode and the mechanical forces acting on the fibrous mass is an important factor in ensuring the effective operation of the machine.

From this perspective, improving the mechanisms of equipment for cleaning wool fibres from impurities and various foreign materials, scientifically substantiating their structural and kinematic parameters, optimising the effect of working organs on the fibrous mass, and expanding the possibilities for automating the technological process constitute a relevant scientific and practical task. In this study, the main mechanisms of a 2BT-type opening and cleaning unit are analysed, and improvement directions aimed at increasing the efficiency of wool fibre cleaning are developed.

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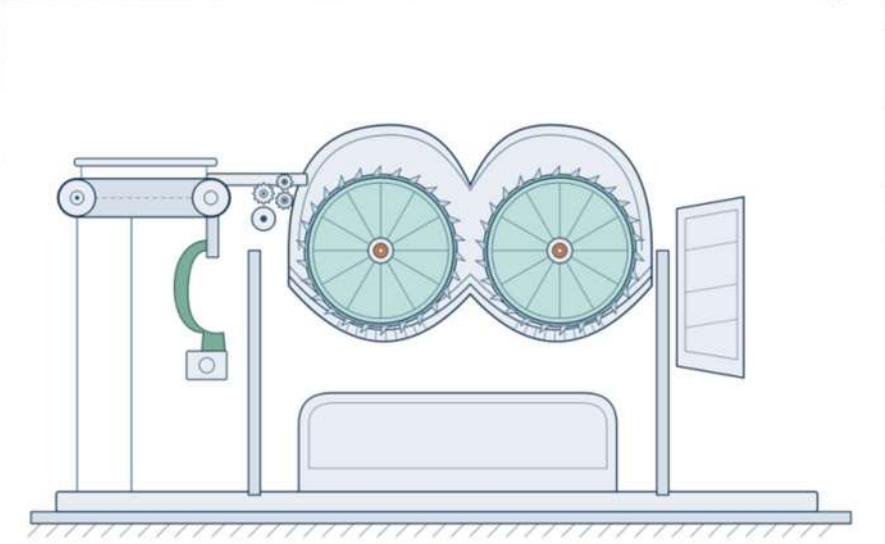


Figure 1. Schematic diagram of the 2BT opening and cleaning unit.

LITERATURE REVIEW.

Studies on the primary processing of natural wool fibres, their cleaning from impurities and various foreign materials, and the production of high-quality semi-finished products indicate that the amount and type of foreign matter contained in raw wool directly affect the efficiency of subsequent technological processes. Wool fibres may contain plant residues, mineral particles, dust, sand and soil particles, grease and suint, as well as other impurities. The degree to which these impurities are removed determines fibre quality, suitability for spinning and the physico-mechanical properties of the finished product [1; 3].

In the state programmes of the Republic of Uzbekistan aimed at the efficient use of existing pastures and the support of silk and wool processing, the deep processing of local wool raw materials, the production of high value-added products and the modernisation of the technological base of processing enterprises are defined as important tasks [1]. This, in turn, increases the need to improve the technological efficiency of primary wool cleaning processes, to modernise the working organs of existing equipment and to introduce advanced technical solutions into production processes.

In the studies conducted by M.A. Nazarova and J.A. Qayumov, the main properties of wool fibres, the possibilities of expanding the use of coarse wool and the issues related to increasing the scale of processing local raw materials were analysed [3]. The authors emphasise the need to take into account the structural characteristics of wool, its degree of contamination and its suitability for processing in order to ensure its efficient use. This approach demonstrates the necessity of selecting technological regimes for wool cleaning in accordance with the properties of the raw material.

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The textbook *Primary Processing of Natural Fibres*, prepared by A. Usmonqulov, A. Salimov, I. Abbazov and F. Egamberdiyev, provides theoretical and practical information on the processing, opening, cleaning, sorting and technological preparation of natural fibres [4]. This source notes that the structural design of working organs, feeding mechanisms, opening elements and the interaction between cleaning zones are of significant importance in the processing of fibrous raw materials. In particular, the uniform feeding of the fibrous layer into the machine is considered one of the key factors in improving cleaning efficiency and reducing fibre damage.

International sources also emphasise the interrelationship between mechanical and chemical cleaning methods in the primary processing of wool. According to the International Wool Textile Organisation and The Woolmark Company, scouring, carbonising, mechanical opening and dust removal are applied either sequentially or as part of an integrated process in the primary processing of wool [5; 6]. In this context, mechanical opening and preliminary cleaning contribute to improving the efficiency of subsequent washing and chemical treatment stages. Therefore, improving the working organs of mechanical wool-cleaning equipment is also important for reducing water, energy and reagent consumption.

In the works of E. Wood on wool scouring and preliminary preparation, the importance of pre-opening and mechanical loosening of raw material before scouring is highlighted [7]. The more uniformly the fibrous mass is opened and the more effectively coarse impurities are removed at the preliminary stage, the more efficient the subsequent removal of contaminants during washing becomes. This confirms the need for the scientifically based selection of the feeding mechanism, drums, pinned working organs and grid bars in opening and cleaning machines such as the 2BT-150Sh.

In recent years, research has also been conducted on the environmentally safe processing of wool fibres. F.A.S. Allafi and co-authors analysed the possibilities of processing wool fibres with reduced water consumption, including the prospects of using supercritical CO_2 technologies [8]. Although such approaches are promising, under practical production conditions the mechanical cleaning stage remains one of the main and economically feasible processes. This is because mechanical cleaning equipment is relatively simple, adaptable to production conditions and capable of removing coarse impurities from raw material at the initial stage.

The analysis of existing literature shows that, in order to clean wool fibres effectively, it is necessary to improve not only the overall technological process but also the individual working organs of the equipment. In particular, the design

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of the feeding mechanism, the arrangement of rollers, spring-loaded compression force, feed belt speed, rotational speed of pinned drums, clearances in the grid bars and the shape of the fibre discharge chute have a direct influence on cleaning efficiency. The literature indicates that vertical, horizontal and inclined methods of feeding the fibrous layer are used, and that horizontal or inclined hopper-type feeding mechanisms are advisable for highly contaminated fibres [4; 7].

At the same time, existing scientific and technical sources do not sufficiently address the specific issues of ensuring uniform feeding of wool fibre in the 2BT-150Sh opening and cleaning machine, removing difficult-to-separate plant impurities, including burrs, and providing kinematic compatibility between the drum-type working organs and the feeding mechanism. This makes it relevant to conduct research aimed at improving the feeding mechanism of the 2BT-150Sh machine, substantiating an inclined hopper-type feeding scheme, determining the geometric and kinematic parameters of the rollers and increasing cleaning efficiency.

Thus, based on the literature review, it may be concluded that, in order to improve the technological efficiency of wool fibre cleaning, the properties of the raw material, the design of the feeding mechanism, the motion of the working organs and the mechanical forces acting on the fibre–impurity mixture should be studied comprehensively. This article specifically considers the improvement of the feeding mechanism of the 2BT-150Sh opening and cleaning machine, the substantiation of its structural and kinematic parameters, and the enhancement of the efficiency of separating impurities from wool fibres.

RESEARCH METHODOLOGY.

The research methodology was based on the analysis of the structural and kinematic parameters of the 2BT-150Sh opening and cleaning machine used in the process of cleaning wool fibres from impurities and various foreign materials. The main focus of the study was directed towards ensuring the uniform feeding of raw wool into the working zone, the effective opening of fibre tufts, the separation of plant and mineral impurities, and the assessment of possibilities for improving the existing feeding mechanism [3; 4].

The 2BT-150Sh opening and cleaning machine was selected as the object of the study. This machine is designed to feed unwashed wool fibre into the working chamber by means of a feed belt, compress the fibrous mass using feed rollers, open it under the action of pinned drums and separate impurities through a grid bar system. The main working organs of the machine include the feed belt, the lower smooth feed roller, the upper grooved feed roller, the first and second pinned drums, the grid bar system, the spring-loaded compression mechanism and the fibre discharge guide.

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In the 2BT-150Sh opening and cleaning machine, unwashed wool fibre is first fed to the feed rollers by means of the feed belt. The feed rollers compress the fibrous mass and direct it towards the first pinned drum. The first pinned drum drags the wool tufts over the grid bars and transfers them to the second drum. Under the action of the second drum, the wool tuft is additionally opened, while dust, mineral particles, plant residues and other impurities contained in it fall through the openings of the grid bars into the waste bunker. This process represents the main stage of mechanical cleaning and contributes to improving the efficiency of subsequent washing and further processing operations [5; 6; 7].

The kinematic scheme of the machine was used as the basis for studying the motion of its working organs. The kinematic scheme makes it possible to analyse the transmission of motion between the feed belt, the feed rollers and the pinned drums. Based on this scheme, the linear speed of the feed belt, the rotational speeds of the smooth and grooved rollers, the rotational speed of the drums and the effect of the number of sprocket teeth on the feed rate were evaluated.

According to the kinematic analysis, the first pinned drum of the machine operates at a speed of 12.5 m/s, while the second pinned drum operates at 14.3 m/s. The speed difference between the drums creates conditions for additional opening of the wool tuft, loosening of impurities located between the fibres and their separation through the grid bars. In this process, the action of the drum pins on the wool tuft, as well as the interaction of the tuft with the prism and fixed pins, is considered one of the main factors intensifying the opening process.

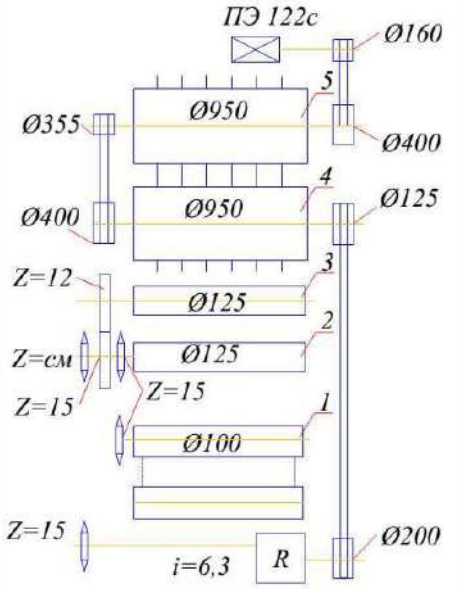


Figure 2. Kinematic scheme of the 2BT-150Sh opening and cleaning machine: 1 — feed belt; 2 — lower feed roller; 3 — upper feed roller; 4 — first pinned drum; 5 — second pinned drum.

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The feeding mechanism serves to supply the wool mass continuously and uniformly into the working chamber. The feeding mechanism of the 2BT-150Sh cleaning machine consists of a feed conveyor, a feed roller, a levelling cylinder and a spring-loaded compression element. In this mechanism, the upper grooved roller rotates faster than the lower smooth roller. This arrangement ensures the displacement, compression and delivery of wool tufts into the working zone. At the same time, the relative arrangement of the rollers, the compression force and the rotational speed have a direct effect on the stable feeding of the fibre layer.

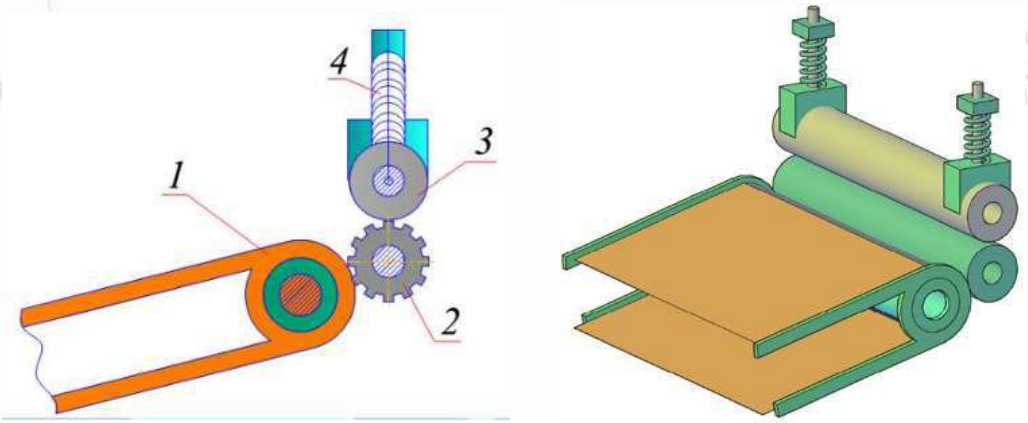


Figure 3. Feeding mechanism of the 2BT-150Sh cleaning machine:
1 — feed conveyor; 2 — feed roller; 3 — levelling cylinder; 4 — spring.

The rotational speed of the feed rollers varies depending on the number of sprocket teeth. In the study, the rotational speeds of the feed belt, smooth roller and grooved roller were comparatively analysed for sprockets with 14, 16, 19, 22 and 25 teeth. The kinematic analysis showed that changes in the number of sprocket teeth directly affect the feed rate of the fibrous mass into the working zone, the load applied to the drums and the overall productivity of the machine.

According to the existing kinematic scheme, the speed regime of the feeding mechanism may not fully ensure stable feeding of the fibre layer. This is particularly evident when raw wool contains a high amount of plant residues, burrs, dust and mineral impurities. In such cases, uneven feeding may occur, resulting in fibre blockage in the working chamber, increased load on the drums, higher energy consumption and reduced cleaning efficiency.

Therefore, the study considered not only the adjustment of roller rotational speed, but also the improvement of the structural arrangement of the feeding mechanism as the main solution. In this regard, the possibility of ensuring uniform delivery of wool tufts into the working zone was substantiated through the inclined arrangement of the feed rollers, stable feeding of the fibrous mass through a hopper and an increase in roller diameter.

The installation position of feeding mechanisms also has a significant influence on the efficiency of the cleaning process. In practice, vertical, horizontal

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and inclined feeding mechanisms are used in opening and cleaning machines. A vertical feeding mechanism is usually installed in the upper part of the working chamber and may be used for cleaning fibrous materials with a relatively low degree of contamination. In this case, the raw material is directed into the working zone under the effect of gravity; however, for highly contaminated fibrous materials that are prone to compaction, uniform feeding may not be achieved.

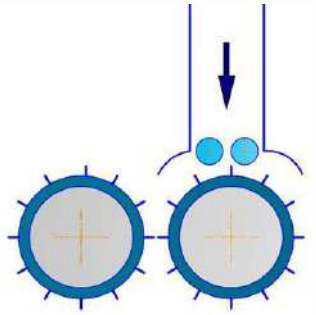


Figure 4. Vertical feeding mechanism.

A horizontal feeding mechanism is considered relatively effective in machines used for opening and cleaning highly contaminated fibres. In this mechanism, the fibre layer is fed into the working chamber in a horizontal direction and delivered to the drum-type working organs by means of feeding pairs. Since wool fibres often contain plant residues, mineral particles and other mechanical impurities, the horizontal feeding scheme has certain advantages in wool cleaning [4; 7].

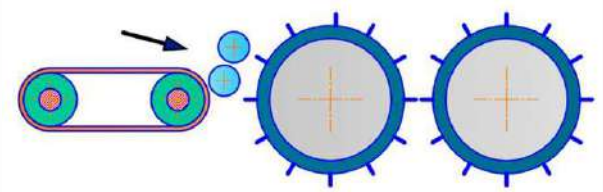


Figure 5. Horizontal feeding mechanism.

However, the horizontal feeding scheme alone may not always ensure completely uniform feeding of wool fibres. In particular, when the raw material contains difficult-to-separate plant residues, burrs, dust and mineral impurities, the fibrous mass may be fed unevenly into the working zone, become blocked or increase the load on the drums. For this reason, the existing types of feeding mechanisms were comparatively analysed in the study, and the use of an inclined hopper-type feeding mechanism was considered appropriate.

In the improved inclined hopper-type feeding mechanism, the fibrous mass is directed to the feed rollers through a hopper. The inclined arrangement of the rollers relative to the machine and the increase in their diameter improve the efficiency of capturing and transporting wool tufts. This structural solution reduces compaction of the fibre layer, ensures uniform feeding of the raw material into the

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working chamber and creates conditions for stable operation of the drum-type working organs.

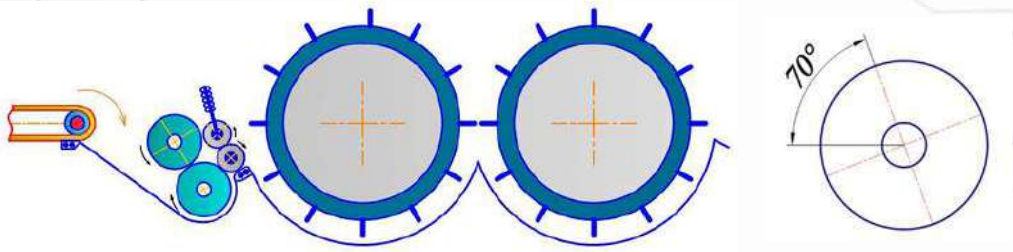


Figure 6. Scheme of the improved hopper-type inclined feeding mechanism.

Several criteria were adopted to evaluate the existing and improved feeding mechanisms. These criteria included uniform feeding of wool fibre into the working zone, the degree of opening of fibre tufts, the efficiency of impurity separation through the grid bars, the possibility of removing difficult-to-separate plant residues, reduction of fibre damage, optimisation of energy consumption and machine productivity. Based on these criteria, the existing design of the 2BT-150Sh machine and the proposed inclined hopper-type feeding mechanism were comparatively analysed.

Thus, the research methodology consisted of analysing the kinematic scheme of the existing machine, comparing the motion parameters of the working organs, evaluating vertical, horizontal and inclined hopper-type feeding arrangements, and substantiating a structural solution aimed at improving the efficiency of separating impurities from wool fibres. This approach makes it possible to improve the feeding mechanism of the 2BT-150Sh opening and cleaning machine, reduce fibre blockage, optimise energy consumption and increase the technological stability of the cleaning process.

DISCUSSION AND RESULTS.

The structural and kinematic analysis of the 2BT-150Sh opening and cleaning machine showed that the efficiency of cleaning wool fibres from impurities and various foreign materials primarily depends on the stable operation of the feeding mechanism. In machines for the primary processing of fibrous materials, the uniform feeding of raw material into the working zone is one of the main prerequisites for opening, loosening and separating impurities [8]. In the 2BT-150Sh machine, raw wool is fed to the roller zone by means of the feed belt, while the rollers compress the fibrous mass and deliver it to the first pinned drum. At the next stage, the first and second pinned drums open the fibre tufts, and dust, mineral particles, fine plant residues and other impurities are separated through the grid bar system.

The analysis showed that, in the existing 2BT-150Sh machine, the first pinned drum operates at a speed of 12.5 m/s, while the second pinned drum operates

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at 14.3 m/s, enabling the gradual opening of wool tufts. The speed difference between the drums contributes to the additional opening of the fibrous mass and the loosening of impurities. Scientific sources also indicate that, in the mechanical opening of fibrous raw materials, the rotational speed of the working organs, their contact time with the fibre and the impact–drag forces in the working zone have a significant influence on the degree of impurity separation [9]. Therefore, the interaction of wool tufts captured by the drum pins with the prism and fixed pins was assessed as an important factor intensifying the opening process.

However, the main drawback of the existing design was found to be the inability of the feeding mechanism to feed wool fibre into the working chamber uniformly. The arrangement of the feed rollers, the compression force and the feed rate do not always ensure stable movement of the fibre layer. This is particularly evident in unwashed wool raw material containing large amounts of burrs, plant residues, dust and mineral impurities, where the fibrous mass may become compacted in the roller zone or enter the working chamber unevenly. This leads to increased load on the drums, higher energy consumption and reduced cleaning efficiency [10].

The analysis of the existing feeding mechanism showed that uneven feeding of the fibre layer negatively affects not only productivity but also fibre quality. This is because wool tufts entering the working chamber irregularly are not subjected to uniform action by the drum pins. Some tufts are insufficiently opened, whereas others are exposed to excessive mechanical action. As a result, on the one hand, impurities may not be completely separated, and on the other hand, the risk of fibre damage increases. Studies on the processing of natural fibres also emphasise that excessive mechanical action adversely affects fibre length, elasticity and suitability for subsequent spinning processes [11].

A comparative analysis of vertical, horizontal and inclined feeding arrangements showed that the vertical feeding scheme is suitable for fibrous materials with a relatively low degree of contamination. In such a scheme, the raw material enters the working zone under the action of gravity; however, for materials such as wool, which are highly contaminated and prone to tufting, the feeding process may become uneven. Although the horizontal feeding mechanism is relatively more effective for feeding highly contaminated fibres, in some cases wool tufts may still become compacted and blockage may occur in the roller zone. A number of studies indicate that the use of hopper-type or inclined feeding schemes is technologically appropriate for stabilising the flow of raw material in feeding mechanisms for fibrous materials [12].

Based on the results of the study, the use of an inclined hopper-type feeding mechanism was considered appropriate for cleaning wool fibres. In the improved

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scheme, the fibrous mass is directed to the feed rollers through a hopper, while the inclined arrangement of the rollers relative to the machine allows wool tufts to be introduced into the working chamber more uniformly. Increasing the roller diameter enlarges the fibre-gripping surface and contributes to the stable movement of wool tufts.

The application of the inclined hopper-type feeding mechanism makes it possible to reduce a number of technological shortcomings observed in the existing mechanism. In particular, the probability of fibre blockage in the roller zone decreases, the flow of raw material supplied to the working chamber becomes more stable, the load on the drums is distributed more uniformly, and the opening and cleaning process proceeds more consistently. This, in turn, contributes to increasing machine productivity, optimising energy consumption and preserving the quality characteristics of wool fibres.

Although the pinned drums and grid bar system in the existing 2BT-150Sh machine provide a certain level of efficiency in separating coarse and fine impurities, their capability to remove difficult-to-separate plant residues, particularly burrs, remains limited. The main reasons for this are the uneven feeding of fibre tufts into the working zone, the non-uniform interaction between the drum pins and the tufts, and the structural imperfection of the fibre discharge chute. Therefore, in addition to improving the feeding mechanism, it is also necessary to comprehensively evaluate the parameters of the pinned drums, fixed pins, grid bars and discharge guide.

Based on the discussion, the use of the improved inclined hopper-type feeding mechanism in the 2BT-150Sh opening and cleaning machine may provide the following technological advantages: improved uniform feeding of raw wool into the working chamber; reduced probability of fibre blockage in the roller zone; stabilisation of the load on the pinned drums; increased consistency of the opening process; improved separation efficiency of plant and mineral impurities; better preservation of fibre quality due to reduced excessive mechanical action; and the creation of conditions for optimising energy consumption and increasing productivity.

Thus, the analysis showed that the main problem of the 2BT-150Sh opening and cleaning machine is associated with the unevenness of the feeding process. The proposed inclined hopper-type feeding mechanism serves to reduce this drawback, stabilise the opening and cleaning process of wool fibres and improve the technological efficiency of the machine. Before applying this structural solution under practical production conditions, the optimal inclination angle, diameter, compression force and feed rate of the rollers, as well as their kinematic compatibility with the drums, should be determined experimentally.

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CONCLUSION.

The conducted analysis showed that the feeding mechanism of an opening and cleaning machine is one of the key technological units in the effective cleaning of wool fibres from impurities and various foreign materials. In the 2BT-150Sh opening and cleaning machine, uneven feeding of raw wool into the working chamber was found to cause fibre blockage, non-uniform distribution of load on the drums, increased energy consumption and reduced cleaning efficiency.

In the existing design, the kinematic interaction between the feed belt, smooth and grooved rollers, spring-loaded compression mechanism and pinned drums provides the opening of wool tufts and the separation of impurities. However, in the case of highly contaminated raw wool containing plant residues, burrs, dust and mineral particles, the existing feeding mechanism may not provide sufficient efficiency in ensuring the stable movement of the fibre layer.

A comparative analysis of vertical, horizontal and inclined feeding arrangements substantiated that the use of an inclined hopper-type feeding mechanism is technologically appropriate for wool fibres. In the improved mechanism, directing the fibrous mass through a hopper, arranging the rollers in an inclined position and increasing their diameter enhance the ability to feed wool tufts uniformly into the working zone.

The proposed inclined hopper-type feeding mechanism makes it possible to reduce fibre blockage in the roller zone, stabilise the load on the pinned drums, improve the consistency of the opening process and increase the efficiency of separating plant and mineral impurities. This structural solution contributes to increasing machine productivity, optimising energy consumption and preserving the quality characteristics of wool fibres.

On this basis, it was concluded that improving the feeding mechanism of the 2BT-150Sh opening and cleaning machine has important scientific and practical significance in the primary processing of wool fibres. In further studies, it is advisable to determine experimentally the optimal inclination angle, roller diameter, compression force, feed rate and kinematic compatibility of the proposed inclined hopper-type feeding mechanism with the pinned drums.

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