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DEVELOPMENT OF A MATHEMATICAL MODEL AND ANALYSIS OF THE RELEASE OF IMPURITIES FROM THE FIBROUS MASS WHEN CLEANING COTTON FIBER USING AN AEROMECHANICAL METHOD

Abstract. The article deals with cotton fiber cleaning in aeromechanical cleaners. Research has established that the fiber cleaning process is accompanied by shock effects on the material, which ultimately negatively affects its quality and quantity. Due to the imperfection of fiber cleaning technology and devices, some of these impurities remain in the fibrous mass, and some of the fibers are lost as part of the outgoing litter. The authors, based on the laws of movement of a continuous medium, obtained the dependences of changes in density, pressure and speed of air flow with fibrous mass on the parameters of the medium.

A pattern has been established for reducing the mass of the fibrous medium as a result of the release of weed impurities from it as a result of impact interaction with fixed grates. It is shown that a significant increase in the amount of isolated weed impurities is observed after interaction with the first four grates of the cleaning section. Further, the removal of impurities is significantly reduced.

It has also been established that, from an economic point of view, it is not advisable to install more than one cleaning section, since the following sections will not give a sufficient cleaning effect even when installing one cleaning section, in order to cover the missing cleaning effect, it is necessary to find ways to improve the machine implement of the fiber cleaner.

Keywords: cotton, fiber, aeromechanical fiber cleaner, fiber vices, weed impurities, saw cylinder, saw teeth, grate, cleaning effect.

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Introduction. One of the main raw materials in the global textile industry is cotton fiber, and in connection with the improvement of spinning techniques and technologies, special attention is paid to improving the quality and yield of yarn per unit weight of fiber. In this regard, consumer requirements for the content of litter and defects in fiber, as well as short, non-woven fibers, have been significantly increased. Based on this, cotton fiber manufacturers, in order to ensure the competitiveness of their products, began to pay more attention to the re-equipment and modernization of cotton processing production processes, the introduction of new technologies and devices that maximize the preservation of the original quality and reduce the cost of fiber.

24-25 million tons of cotton fiber are produced annually in the world, and its consumption is over 25 million tons, the shortage of which is covered by inventories amounting to about 18 million tons [1]. The leading cotton fiber supplier countries are India, China, the USA, Pakistan, Brazil, Uzbekistan, Australia, Turkey, Argentina and Greece, which produce more than 70% of the total global volume of cotton fiber. Experts' forecasts show that due to climate change, adverse weather conditions and lack of water resources, the acreage under cotton tends to gradually decrease, which in order to meet the needs of the market and maintain current production volumes, producers are forced to find ways to maximize the use of raw materials, reduce its losses at all stages of production, preserve natural properties and initial quality indicators of the material.

Studies show [2-4] that each cotton processing process is accompanied by impact effects on the material, which ultimately negatively affects its quality and quantity. Calculations of the raw material balance show that 3-5% of raw cotton goes away as part of non-returnable waste, and defects in the form of flagella, plastics, immature seeds (motes), crushed seeds, skins with fiber, tangled nodules, short fibers, as well as weed impurities in the form of leaf particles, bracts, stems, cotton pods, twine particles, straw, dust, sand, etc.

Studies have established [5-7] that the most significant effect on the initial quality indicators is in the process of fiber separation, in which part of the fibers breaks, short-step fibers are formed, seeds are crushed, which results in the formation of a skin with fiber and litter, in the form of particles of crushed seeds. Other defects and litter are formed during transportation, cleaning, and some, for example, puny seeds, motes – during the cultivation of cotton, and the main part of the litter – during the collection and harvesting of raw cotton.

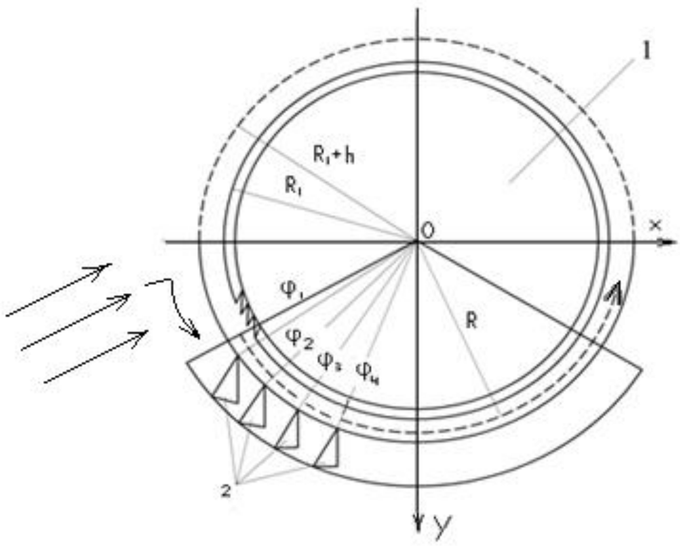
Materials and methods. *The process of fiber cleaning of domestic, aeromechanical cleaners.* The fiber cleaning process is designed to remove debris and defects from the mass of the fiber produced. However, due to imperfections in the technology and cleaning devices, some of these impurities remain in the fibrous mass, and some of the fibers go away as part of the outgoing litter [6]. At the same time, the fiber, namely, after cleaning, is sent to the packaging process as a finished product. Hence, it can be concluded that the fiber cleaning process is the final stage of the primary cotton processing process, where the final qualitative and quantitative indicators of the finished product, cotton fiber, are formed.

In this regard, these studies are aimed at developing a mathematical model of the fiber cleaning process, in order to establish the causes of low cleaning efficiency and care of the spun fibers in the composition of the selected litter.

The domestic fiber cleaning system is based on mechanical action on the material transmitted in the air stream. Therefore, this process is called an aeromechanical (or pneumomechanical) cleaning method.

Studies have found that cleaning cotton fiber from litter and defects is most effective immediately after its exit from the fiber separation machine (gin) [7,8]. At the same time, the fiber is in a loosened state and in these conditions it is advisable to use special devices for cleaning fibers from weed impurities.

The domestic fiber cleaning system provides for a cleaning scheme shown in Figure 1, where a saw cylinder rotating towards the movement of the air mixture (i.e., a mixture of fiber with an air stream) captures the fibers with saw teeth and drags them in the direction of its rotation, where, under the saw cylinders, along the arc of their rotation, fixed grates are installed, in the form of steel rods of various shapes and sizes, with the possibility of interaction of fibers captured by the teeth of the saw blades of the saw cylinder. In the cleaning zone, where the impact interaction of the fibrous mass with the grates occurs, as a rule, the fibrous mass shakes, mutual movement of fiber particles occurs and it loosens, space is formed for the release of weed impurities. As a result, the density and mass of fiber bundles decreases due to an increase in the volume of shreds and the removal of weed impurities from its composition. In this zone, due to the resistance of the stationary grates, the velocity of the final layer of the fibrous mass flow moving in the space between the grates and the saw cylinder decreases.



1 – saw cylinder, 2 – grates.

Fig. 1. Diagram of the cleaning zone of the fiber cleaner

At the end of the cleaning zone, the fiber leaves the saw teeth under the action of inertia and centrifugal force and begins to move under the action of the aerodynamic force of the air flow. There are fiber cleaners for single, double and triple cleaning, with one, two and three saw cylinders. In the case of a single cleaning, the fiber in the composition of the air flow leaves the purifier chamber and rushes to the condenser through the pneumatic transmission pipeline. And, in the case of double and triple cleaning, it is transferred to the next saw cylinder and the cleaning process will be identically repeated.

Mathematical model of the fiber cleaning process. Description of the process. To do this, we assume that the flow is stationary, and the flow is a continuous medium. To describe the state of stationary flow motion, it is required to use the basic principles of continuum mechanics [9,10]. If we consider the thickness of the fiber layer to be sufficiently small, then its speed differs almost insignificantly from the speed of the saw drum, and therefore the decrease in mass in the zone of interaction of fibers with grates occurs only due to a change in its density. In this case, you can use the purification model proposed by A.G. Sevostyanov [11]. This model is simple and does not require the use of the equation of state of the fibrous mass.

Let us consider the stationary movement of the fiber flow in the chamber of the cleaning machine, where cotton fiber continuously flows at a flow rate of Q. The residence time of the fiber in the cylindrical chamber, provided that the grate occupies q - part of the chamber surface, is $T = q/\omega$, where ω – is the angular velocity of the saw drum. Due to the stationarity of the process, the same mass of fiber enters the chamber over time T equal to $m_0 = QT = Qq/\omega$. Let's establish the change in this mass during the passage of the camera from $t = 0$ to $t = T$.

Let's take the polar coordinates set in the center of the saw cylinder (Fig.1). Let's also assume that the outer boundary of the fiber layer interacts with the grates according to the Coulomb dry friction law; we consider the impact of forces from the grates to be point-like. The model of a compressible medium in the cleaning zone $R_1 < r < R_1 + h,\ \varphi_0 < \varphi < \pi - \varphi_0$ according to the Euler equation [11], has the form:

$$\rho w \frac{dw}{d\varphi} = -\frac{dp}{d\varphi} - f\,\frac{R}{R_1 + h}\sum_{i=1}^{N}\rho_i w_i^2 \delta(\varphi - \varphi_i),\quad \varphi_0 < \varphi < \pi - \varphi_0 \tag{1}$$

Law of conservation of mass flow:

$$\rho w S = \rho_i w_i S = const = \rho_0 w_0 S = Q \tag{2}$$

Equation of state of the medium establishing the relationship between pressure and flow density:

$$\rho = \rho_c[1 + A(p - p_c)], \tag{3}$$

where $w(r,\varphi)$ – is the angular velocity of the flow, f – is the coefficient of friction between the fiber and the grate, R_1 – is the radius of the saw cylinder, h – is the thickness of the layer of fibrous mass, $\delta(\varphi\text{-}\varphi_i)$ – is the Dirac function [12-14], indicating the action of a concentrated force at the point $\varphi = \varphi_i$, p_i and w_i – are the values of the function $p(\varphi)$ and $w(\varphi)$ at points $\varphi = \varphi = \varphi + \frac{\pi - 2\varphi_1}{N-1}(i-1)$ and N – is the number of grates subject to determination; S = Lh, ρ_0 – density of the fibrous mass at the entrance to the chamber, $w_0 < w_n$ – speed of supply of raw materials to the cleaning zone ($w_0 < w_n$. w_n – linear speed of the saw cylinder), Q – machine productivity, L – length of the cylinder; A – coefficient of compliance of the fibrous mass, p_0 – flow pressure at the entrance to the chamber. Using equality (2) we express the density p_i andpressure p at the flow rate $A << 1$ in the cleaning zone w:

$$\rho = \frac{\rho_0 w_0}{w}, \tag{4}$$

$$p = p_0 + \frac{1}{A}\left(1 - \frac{w}{w_0}\right) \tag{5}$$

Taking into account (2) and (4), $R/(R_1 + h) \sim 1$ assuming for $h/R\sim 0$, we obtain an equation for w:

$$\frac{d\vec{w}}{d\varphi}=-\frac{f}{q}\sum_{i=1}^{N}\overline{w}_i\delta(\varphi-\varphi_i) \qquad (6)$$

where $\overline{w}=w/w_0$, $\overline{w}_i=w_i/w_0$, $q=1-\frac{1}{A\rho_0 w_0^2}$

Since loosening of the flow occurs in the cleaning chamber, the condition is necessary $\rho<\rho_0$. In accordance with dependence (2) we have $w>w_0$, and from equation (6) $\frac{dp}{d\varphi}>0$ it follows that it is necessary that q >0 or $w_0<\sqrt{\frac{1}{Ap_0}}$. If we denote K the compressibility modulus of a fibrous mass, then its malleability will be equal to $A = 1/K$. Then $w_0<\sqrt{\frac{1}{Ap_0}}$ it follows from the inequality $w_0<c_0$, where $c_0=K/p_0$ – is the velocity of propagation of the compression wave in the fibrous mass. So for example, if we accept $A=0.001Па^{-1}$, then we have $K=10^3Па$, then taking $p_0=10кг/м^3$, we get $c_0=8м/с$.

Assuming, $q=-q_0$ ($q_0=\frac{1}{Ap_0w_0^2}-1$), the solution to equation (6) for various angle values φ_i is obtained in the form:

$$\overline{w}=\overline{w}_0=1 \text{ at } \varphi<\varphi_1$$
$$\overline{w}=\overline{w}_1=1+b\overline{w}_1 \text{ at } \varphi_1<\varphi<\varphi_2$$
$$\overline{w}=\overline{w}_2=1+b\overline{w}_1+b\overline{w}_2 \text{ at } \varphi_2<\varphi<\varphi_3$$
$$\overline{w}=\overline{w}_i=1+b\overline{w}_1+b\overline{w}_2+....+b\overline{w}_{i-1}+b\overline{w}_i \text{ at } \varphi_i<\varphi<\varphi_{i+1}$$
$$\overline{w}=\overline{w}_{N-1}=1+b\overline{w}_1+b\overline{w}_2+....+b\overline{w}_{i-1}+...+b\overline{w}_{N-1} \text{ at } \varphi_{N-1}<\varphi<\varphi_N$$
$$\overline{w}=\overline{w}_N=1+b\overline{w}_1+b\overline{w}_2+....+b\overline{w}_{i-1}+...+b\overline{w}_N \text{ at } \varphi>\varphi_N$$

where $b=f/q_0$.

From these equations we find the flow velocity after interaction with the grate:

$$\overline{w}_i=c^i \quad (i=1,2,3...N)$$

where $c=1/(1-b)=q_0/(q_0-f)$.

Since $q_0>f$, then the feed rate w_0 must satisfy the inequality:

$$w_0<c_o/\sqrt{1+f} \qquad (7)$$

For the density after each interaction of the flow with the grate bars, the following dependencies were obtained:

$$\rho=\rho_0 \text{ at } \varphi<\varphi_1$$

$$\rho = \rho_i = \frac{\rho_0}{c^i} = \rho_0 \left(\frac{q_0 - f}{q_0} \right)^i \text{ at } \varphi_i < \varphi < \varphi_{i+1} \; i = 1..N-1$$

(8)

$$\rho = \rho_N = \rho_0 \left(\frac{q_0 - f}{q_0} \right)^N \text{ at } \varphi > \varphi_N$$

Let's establish a pattern of reducing the mass of the fibrous medium as a result of the release of weed impurities. According to [11], as a result of loosening, the density of the fibrous mass decreases by an amount *dp*, then its volume will be equal to:

$$V + dV = \frac{m - dm}{\rho - d\rho} \qquad (9)$$

Following the work [11], let's assume that the relative change in fiber mass in a section is proportional to the relative change in fiber volume:

$$\frac{dm}{m} = \frac{dV}{aV}, \; (i = 1,2,3,\ldots N) \qquad (10)$$

where $a > 0$ – is the proportionality coefficient.

Using expressions (9) and (10), we establish:

$$\frac{dm}{m} = \frac{d\rho}{(1+p)\rho} \qquad (11)$$

Unlike the work [11], where the contact of the mass with the grates occurs simultaneously along the entire arc, we believe that contact along this arc in stationary mode occurs point-wise and the velocity of the shred at the points of contact will be different. Let us denote by m_0 – the mass of the unrefined fibrous medium entering the cleaning zone m_i – the mass of the fiber after interaction with *I* – the grate. Integrating equations (11) after the interaction of the flow with the grate (8), we obtain:

$$m = m_0 \text{ at } \varphi < \varphi_1$$

$$m = m_i = m_0 \left(\frac{\rho_i}{\rho_0} \right)^{\lambda} = \frac{m_0}{c^{i\lambda_i}} = m_0 \left(\frac{q_0 - f}{q_0} \right)^{\lambda i_i} \text{ at } \varphi_i < \varphi < \varphi_{i+1} \; i = 1..N-1$$

$$m = m_N = \left(\frac{\rho_N}{\rho_0} \right)^{N\lambda_N} = \frac{m_0}{c^{N\lambda_N}} = \left(\frac{q_0 - f}{q_0} \right)^{\lambda_N N} \text{ at } \varphi > \varphi_N$$

where, according to [11] $\lambda_i = \lambda_0 /(1+p)^{i-1}$.

The amount of weeds released after interaction with the first grate will be: $\Delta m_1=m_0-m_1=m_0\varepsilon_1$, where $\varepsilon_1=1-c_1^{-\lambda} = 1-(1-b)^{\lambda 1}$ – is the cleaning efficiency.

Similarly, the amount of released impurities after interaction with the second grate is calculated by the formula:

$$\Delta m_2 = (m_0 - \Delta m_1)\varepsilon_2 = m_0(1-\varepsilon_1)\varepsilon_2\ ,\quad \varepsilon_2 = 1-(1-b)^{2\lambda_2}$$

The amount of released impurities after interaction with *i* –the grate will be:

$$\Delta m_i = (m_0 - \Delta m_1 - \Delta m_2 - ... - \Delta m_{i-1})\varepsilon_i = m_0(1-\varepsilon_1)(1-\varepsilon_2)...(1-\varepsilon_{i-1})\varepsilon_i \quad (12)$$

where $\varepsilon_1= 1-(1-b)^{\lambda 1}$.

The total amount of isolated weeds after interaction with all grates, taking into account (12), will be presented as a sum:

$$M = \sum_{i=1}^{N} \Delta m_i = m_0[\varepsilon_1 + (1-\varepsilon_1)\varepsilon_2 + (1-\varepsilon_1)(1-\varepsilon_2)\varepsilon_3 + ... + (1-\varepsilon_1)(1-\varepsilon_2)...(1-\varepsilon_{N-1})\varepsilon_N]$$

If we denote by *n* the percentage of incoming impurities in the cleaning zone of the fibrous mass, then when it is completely cleaned of impurities, the equality $M= 0.01nm_0$ is fulfilled.

Research results and discussion of scientific results. The solution of inequality (7) relatively w_0 determines the maximum feed rate w_{0k}, at which $w_0<w_{0k}$ the cleaning process is realized without the formation of zones of disruption of the continuity of the fibrous mass flow.When choosing a parameter *A* it is assumed that the loosening condition is met, in which the density of the fibrous mass upon leaving the cleaning zone of the second section decreases.Int he calculations it is assumed $p_0=20кг/м^3$, $h=0.025м$, $Q=2000\div3600кг/с$, $L=1.64м$, $\lambda_0=1.5$, $p=0.6$. The speed of wave propagation c_0 and the feed rate of raw materials according to the flow rate formula $w_0=Q/p_0hL$ in the cleaning zone will be respectively equal to $c_0=9.534\ м/с$, $w_0=4.13\ м/с$.It can be seen that condition (7) is satisfied for the selected parameters. Calculations have established that the specified loosening is carried out when choosing the value of the parameter $A=0.000381/$Па. Calculations were performed for three options for the number of grates in the section $N=4$, $N=6$, $N=8$.

Figure 2 shows the values of density p_i and amount of impurities removed dm_i (in percent) between the grates, respectively. At the same time, the total amount of isolated weeds will be:

At $N=4$ $S_1=\sum_{i=1}^{4} dm_i = 24.7\%$, at $N=6$ $S_1=\sum_{i=1}^{4} dm_i = 30.9\%$, at $N=8$ $S_1=34.0\%$

It follows from the analysis of the results that a significant increase in the amount of isolated impurities is observed after interaction with the first four grates of the purification section. Further, the removal of impurities is insignificant.

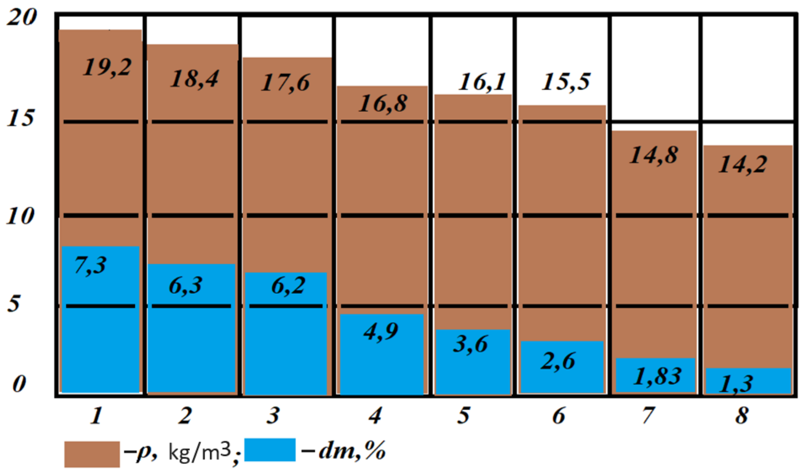


Fig.2. Results of calculations of change of density and quantity of weed impurities

An increase in the parameter λ_0 also leads to an increase in the amount of impurities released, this is noticeable with fewer grates. The compressibility properties of the incoming raw materials, determined by the coefficient of compliance *A* (compressibility modulus *K*) and density p_0, ultimately characterizing the wave propagation velocity, can have a significant effect on the change in the amount of impurities c_0. An increase in this rate c_0, which is associated with an increase in the stiffness of the material, leads to a decrease in the amount of impurities released, which is associated with an increase in the stiffness of the material, leads to a decrease in the amount of impurities released.

The stiffness of a single cotton fiber is its natural property and should be accepted as a natural phenomenon, permanent. However, the stiffness of a fiber bundle is the sum of the stiffness of its components. I.e., the fewer the number of fibers in the bundle, the less its stiffness and vice versa. Therefore, in order to reduce the stiffness of the fiber bundles, the number of fibers in the bundle should be reduced. This can be achieved by increasing the speed of saw cylinder.

As we noted above, according to the existing designs of domestic fiber cleaners, the number of cleaning sections can be up to three. We have studied the cleaning process in one section. In the following sections, the cleaning process will be identically repeated. However, as can be seen from the research results, the cleansing effect of the following sections will be much lower than in the first one.

Calculations have shown that with the number of grates in the section of 8 pieces, the cleaning effect of the 2nd section is only 2.6%. And, installing the 3rd section can increase the cleaning effect by less than 1 percent. Therefore, from a technological point of view, the installation of the 2nd section can be considered appropriate, although, from an economic point of view, this action does not justify itself. And, there can be no question of installing a 3-section, because it is not advisable from any point of view.

The installation of 2 sections can be with different ratios of the number of grates 4x8; 5x8; 6x8, because the cleaning arc, where it is advisable to install grates, of the first section is limited by the second saw cylinder, and the second section has no restriction.

There is another option – as mentioned above, from an economic point of view, it is advisable to install one cleaning section, and the missing cleaning effect (it is not very large) can be covered by improving the working organs of the machine.

Conclusion. 1. Studies have found that each cotton processing process, as well as fiber cleaning, is accompanied by impact effects on the material, which ultimately negatively affects its quality and quantity.

2. The fiber cleaning process is designed to remove debris and defects from the mass of the fiber produced. However, due to imperfections in the technology and cleaning devices, some of these impurities remain in the fibrous mass, and some of the fibers go away as part of the outgoing litter.

3. On the basis of the laws of motion of a continuous medium, the dependences of changes in density, pressure and velocity of the air flow with a fibrous mass on the parameters of the medium are obtained.

4. The regularity of decrease in mass of fibrous medium as a result of separation of weed impurities from it due to impact interaction with fixed grates is established.

5. By analyzing the results, it was found that a significant increase in the amount of extracted weed impurities is observed after interaction with the first four grates of the cleaning section. Further, the departure of impurities significantly decreases.

6. It was found that the stiffness of the fiber bundle significantly affects the release of weed impurities from the fiber. This can be achieved by increasing the speed of the saw cylinder.

7. It has also been established that from an economic point of view, it is not advisable to install more than one cleaning section, since the following sections will not have a sufficient cleaning effect. This shows that when installing one cleaning section, in order to cover the missing cleaning effect, it is necessary to find improvements in the working organs of the fiber cleaner.

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АЭРОМЕХАНИКАЛЫҚ ӘДІСПЕН МАҚТА ТАЛШЫҒЫН ТАЗАЛАУ КЕЗІНДЕ ТАЛШЫҚТЫ МАССАДАН ҚОСПАЛАРДЫҢ БӨЛІНУІНІҢ МАТЕМАТИКАЛЫҚ МОДЕЛІН ЖАСАУ ЖӘНЕ ТАЛДАУ

Аңдатпа. Мақалада аэромеханикалық тазартқыштардағы мақта талшығын тазарту мәселелері қарастырылады. Зерттеулер көрсеткендей, бұл процесс талшықты тазарту материалға әсер етумен бірге жүреді, бұл оның сапасы мен мөлшеріне теріс әсер етеді. Талшықты тазарту технологиясы мен құрылғыларының жетілмегендігіне байланысты мұндай қоспалардың бір бөлігі талшықты массаның құрамында қалады, ал талшықтардың бір бөлігі шығатын қоқыстың құрамында қалады. Авторлар қатты ортаның қозғалу заңдарының заңдарына сүйене отырып, ауа ағынының тығыздығының, қысымының және жылдамдығының өзгеруінің талшықты массасы бар қоршаған орта параметрлеріне тәуелділіктерін алды.

Қозғалмайтын торлармен әсерлесу нәтижесінде одан арам қоспалардың бөлінуі нәтижесінде талшықты орта массасының азаю заңдылығы анықталды. Оқшауланған арам қоспалар санының едәуір артуы тазарту бөлімінің алғашқы төрт торымен өзара әрекеттесуден кейін байқалады. Әрі қарай, қоспалардың күтімі айтарлықтай төмендейді.

Сондай-ақ, экономикалық тұрғыдан алғанда, бірнеше тазарту бөлімін орнатқан жөн емес, өйткені келесі бөлімдер жеткілікті тазарту әсерін бермейді және бір тазарту бөлімін орнатқан кезде, жетіспейтін тазарту әсерін жабу үшін талшықты тазартқыштың жұмыс органдарын жетілдіру жолдарын іздеу керек.

Тірек сөздер: мақта, талшық, аэромеханикалық талшықты тазартқыш, талшық ақаулары, арамшөптер, ара цилиндрі, ара тістері, тор, тазарту әсері.

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РАЗРАБОТКА МАТЕМАТИЧЕСКОЙ МОДЕЛИ И АНАЛИЗ ВЫДЕЛЕНИЯ ПРИМЕСЕЙ ИЗ ВОЛОКНИСТОЙ МАССЫ ПРИ ОЧИСТКЕ ХЛОПКОВОГО ВОЛОКНА АЭРОМЕХАНИЧЕСКИМ МЕТОДОМ

Аннотация. В статье рассматриваются вопросы очистки хлопкового волокна в аэромеханических очистителях. Исследованиями установлено, что процесс очистки волокна сопровождается ударными воздействиями на материал, что в конечном итоге, отрицательно сказывается в его качестве и количестве. Из-за несовершенства технологии и устройств очистки волокна, часть таких примесей остаются в составе волокнистой массы, причем некоторая часть волокон уходит в составе выходящего сора. Авторами на основе законов перемещения сплошной среды получены зависимости изменения плотности, давления и скорости движения потока воздуха с волокнистой массой от параметров среды.

Установлена закономерность уменьшения массы волокнистой среды в результате выделения из нее сорных примесей в следствие ударного взаимодействия с неподвижными колосниками. Показано, что, существенное увеличение количества выделенных сорных примесей наблюдается после взаимодействия с первыми четырьмя колосниками очистительной секции. Далее, уход примесей значительно снижается.

Установлено, также, что с экономической точки зрения, не целесообразна установка более одной секции очистки, т.к., следующие секции достаточного очистительного эффекта не дадут и при установке одной секции очистки, для покрытия недостающегося очистительного эффекта необходимо найти пути совершенствования рабочих органов волокноочистителя.

Ключевые слова: хлопок, волокно, аэромеханический волокноочиститель, пороки волокна, сорные примеси, пильный цилиндр, зубья пилы, колосник, очистительный эффект.