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ANALYSIS OF EXTRAORDINARY COTTON AND LINTERING SYSTEMS IN MODERN PROCESSING COTTON TECHNOLOGY

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Annotation
The ginning of medium-fiber cotton varieties in the Uzbek ginning industry is carried out mainly with the help of 3XDDM, DP-130, 4DP-130 and 5DP-130 saw gins [2]. Leading U.S. manufacturers of modern gin and linter machines are Continental and Lummus. The difference between them and the demons produced in our country is that they have two chambers, the first of which is shelushchilnyy, and the second is a working chamber. The working camera is smaller and has a rotator inside. The control of the U.S. saw blades is highly automated and is controlled by the density of the cotton in the working chamber and the operation of the saw cylinder and the sensors that detect the cotton being fed. The fibers are separated from the saw cylinder by a brush drum or by air [3 ÷ 7]. In the United States, lintering of infected seeds is carried out in oil companies. The operation of linters is no different from ours [8]. In the process of processing, the total fineness of ginned seeds is 15-17% and more, and the staple mass length of the produced fibers is short and uneven. In most cases, the fiber is not completely ginned and free fibers are separated.

Keywords: Fiber, saw, gin, seed, camera, dynamics, fluff.

Introduction

1.1.1- In solving these problems, the scientific, theoretical and practical calculations of the main parts of the genus Arrali in general were studied by scientists B.A. Levkovich, B.I. Rogonov, A.V. Vzenkonsky, G.I. Boldinsky, P.V. Baydyuk, N.G.Gulidov, N.A.Shemshurin, V.S.Kan, D.A.Kotov, R.F.Maxkamov,

G.I.Miroshnichenko, P.N. Tyutin, C.N.Nusratov, T.S. Saidkhodjaev, A.D.Sapon, X.K.Davidbaev, E.T.Maksudov, A.P.Parpiev, R.M.Kattaxodjaev, I.K.Khafizov, B.M.Mardonov, A.J.Juraev, There are scientific researches of A.E.Lugachev, M.T.Tillaev, H.T.Akhmedkhodjaev, V.D.Khymyrov, F.N.Saadi, R.F.Yunusov [9 ÷ 30] and others, but in post-demon seeds the problem of ensuring that the fibers suitable for spinning do not come out is still solved to this day. Preliminary studies on the dynamics of the sawing process [9] show that in the working chamber of the jinn, the fiber in the seed is unevenly separated over time, and the fiber obtained can be in the working chamber for 10 seconds to 14 minutes. As a result, the seeds coming out of the working chamber have different fibers, which means that in a short time the seeds are high in fiber, and the seeds left in the chamber for a long time are very clean. In some cases there is a difference between the fluffiness of the ginned seeds at different times in the gin chamber. The different fluffiness of the seeds coming out of the jinn's working chamber indicates that the lintering process takes place in the jinn along with the jinn process. The results of group studies of seeds separated from the working chamber in the process of ginning [10] show that they form several fractions: the main mass is 84.95-97.37% of normal gin and the weight of the seeds is 0.02-0. , 20 percent fiber fiber seeds; 2.10-9.70% of the fiber is not completely germinated seeds; crop fiber 0.01-0.15 percent; contaminants (cotton stalks, horns and cotton, pumpkin pieces, mineral contaminants - dust, soil and sand) 0.5-5.0%. Thus, the data on the fractional composition of the seeds separated from the working chamber during the ginning process show that the maximum amount of spun fiber is in the seeds that are not completely ginned, so the technology of spinning fiber in this direction is in this direction. development is expedient. It should be noted that in recent years, the ginning industry has introduced Namangan-77, Ak-Darya-6, Bukhara-6 and other new selection varieties. These differ in the biological properties and the amount of fiber layer in the previously developed varieties. At the same time, the gin used in ginneries has not been structurally modified. Therefore, despite the emergence of new selection varieties of cotton, in the total mass of seeds in ginning, the fiber is not completely ginned seeds and free fiber has a different ratio. Demand for fiber quality and fiber supply in connection with the transition to a market economy. This requires improving the quality and yield of fiber in the ginning industry, improving the technological process of primary processing of raw cotton, the introduction of science-based design changes. At different times by scientists [11 ÷ 22] to increase the yield and quality of fiber saw blade working parts: lengthening the seed comb piles to reduce the distance between the tip of the seed comb and the column, reducing the distance between saws, changing operating modes, increased the diameter of the saw,

and tried to do so at the expense of constructive modification of the working and air chambers and various rotary accelerators. Extending the seed comb pile by 10–20 mm, respectively, in conjunction with shortening the comb spacing with a columnar grate, slightly reduced the yield of full-fiber seeds and fully fiber-free seeds, but in this case the seed output from the working chamber was significantly reduced. slowing down, a decrease in the productivity of the demon is observed by 20-30 percent. In addition, the use of a seed comb in such a design resulted in a 9-10% drop in hair shedding, leaving the seeds exposed. At the same time, the quality of the fiber has declined due to an increase in the amount of pollutants in the fiber content resulting from a 0.2-1.8% increase in short fiber and seed damage. Experiments show that the practical application of such a constructive solution in the ginning plant is not justified. Reducing the sawing distance, on the other hand, affects the quality of the fiber and requires the use of gaskets between the saw blade, the chisel, and the saws, which are geometrically new in the working chamber of the saw. Since the 1960s, some ginneries of the Republic have been using 100 and 90-gin demons on the basis of the working chamber of the 3XDDMrus demon. In the first case, the sawing distance is 15.5 mm, in the second - 17.3 mm. The second option is preferred because studies have shown that the recommended minimum value of saw spacing is 16.35 mm [16]. Further shortening of the distance between the saws led to a reduction in the length of the fiber, as well as a decrease in the quality of the fiber due to the high number of damaged seeds. The use of a 90-saw blade resulted in a 0.05-0.10 percent reduction in fiber loss, but at the same time the saw productivity per saw decreased by 10-15 percent as the reduction in saw distance made it more difficult for the seed to germinate. This, in turn, leads to a longer stay of the seed in the working chamber, an increase in damage and a decrease in fiber quality. The results of the research show that it is practically impossible to completely eliminate the fall of raw cotton seeds from the working chamber of fully fibrous seeds and seeds that are not completely ginned. Standards for the degree of complete fluffiness of cotton seeds that have undergone sawing are mandatory documents, and PDKI-56-84 has been introduced instead of the standards of residual fiber fibers in the field [23, 24]. The criteria for the degree of complete fluffiness of the seeds are given in Table 1.1.1 in accordance with the requirements of UzDSt-1994, as well as the degree of complete fluffiness of the seed after sawing. applies to all industrial varieties and classes that ensure product production.

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1.1.2- 1.1.1- Table. Complete fluffy standards in the field of technical cotton seeds, which have gone crazy

An industrial variety of cotton	The degree of total fluffiness of seeds by selection varieties, percent		
	C-6524, Namangan-77	An-Bayaut-2	Bukhara-6
I	10,5	12,0	11,5
II	11,0	12,5	12,0
III	11,5	13,5	12,5
IV	12,0	14,0	13,0
V	12,0	14,5	13,5

Note: ± 0.5% (absolute) deviation is allowed at full fluff level.

In order to better understand how these standards are implemented in ginneries, statistical data on the quality indicators of all industrial varieties of different selection varieties produced in ginneries of Tashkent region in 1996-2000 (1.1.2-1.1. 6 tables) were examined.

The analysis of the indicators in Table 1.1.2 shows that the first

Table 1.1.2. Statistical data on the technological parameters obtained after demons during the initial operation of the first industrial varieties of cotton of different selection varieties in ginneries

№	The name of the company	Selection type	Group №	The weight of the group, t	The amount of defective and dirty compounds in the fiber, percent	Residual fiber, g	Full fluff of seeds, percent
1	Olimkent	C-6524 Нам-77	56 89	104 291	4,0 3,0	0,110 0,100	11,3 10,2
2	Dalvarzin	C-6524 Ан-Баяут-2	46 44	447 456	3,0 3,0	0,067 0,067	12,0 12,1
3	Independence	C-6524 C-6524	11 10a	425 39	3,0 4,5	0,100 0,100	10,5 10,5
4	White-tailed deer	C-6524	61a 103	472,2 329,6	2,5 4,0	0,108 0,107	10,5 10,4
5	Pekent	C-6524 Нам-77	49 39	22 278	3,5 3,0	0,105 0,103	12,5 11,9
6	Uzbekistan	C-6524 Нам-77	20б 30б	140 114	3,8 3,0	0,100 0,100	11,1 11,1
7	Yangiyol	C-6524 C-6524	201 209	102 321	5,0 7,0	0,108 0,112	11,4 11,6

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In terms of industrial varieties, the fiber content of 200 ginned seeds is 0.067-0.112 g for all enterprises, and the total fiber content of seeds is in the range of 10.2-12.5%, for the second industrial type (Table 1.1 .3) these figures are 0.069-0.116 g and 10.6-12.5 per cent, while those of the third industrial type (Table 1.1.4) are 0.073-0.126 g and 10.7-12.5 per cent, respectively. in the fourth industrial grade (Table 1.1.5) 0.073-0.140 g and 10.4-12.9 per cent, and in the fifth industrial grade (Table 1.1.6) between 0.077-0.140 g and 11.0-12.6 per cent. indicates that it is ideal [25].

In order to study these indicators in more detail, the results obtained during the tests conducted in 2001-2005 in the inspection group (control party) of some ginneries of the Republic also examined the indicators of fiber content and complete fluffiness in post-demon seeds. [26]. Data on their quality indicators are given in Table 1.1.7. The analysis shows that Table 1.1.2 shows that the total fineness of seeds of the first industrial varieties of cotton is 1.2-12.5%, the residual fiber is in the range of 0.069-0.114 g, while Table 1.1.6 The 5th industrial varieties have a total hair density of 11.0-12.6% and residual fibers in the range of 0.069-0.150 g. The layout diagram for the length of the medium-fiber cotton fiber is shown in Figure 1.1.1. The fiber is 16 mm or more in length and is suitable for spinning [27] and must be separated during the ginning process. However, one of the serious shortcomings of the ginning process is the presence of short fibers of 15 mm and less in length, as well as the presence of spinning fibers in the lint obtained during the lintering of ginned seeds. The analysis showed that even if the total fluffiness of the seed after the gin is less than the total fluff standards in the industry, there is a residual fiber suitable for spinning in the seed, in addition to the technological spinning process.

Medium-fiber cotton fiber length diagram

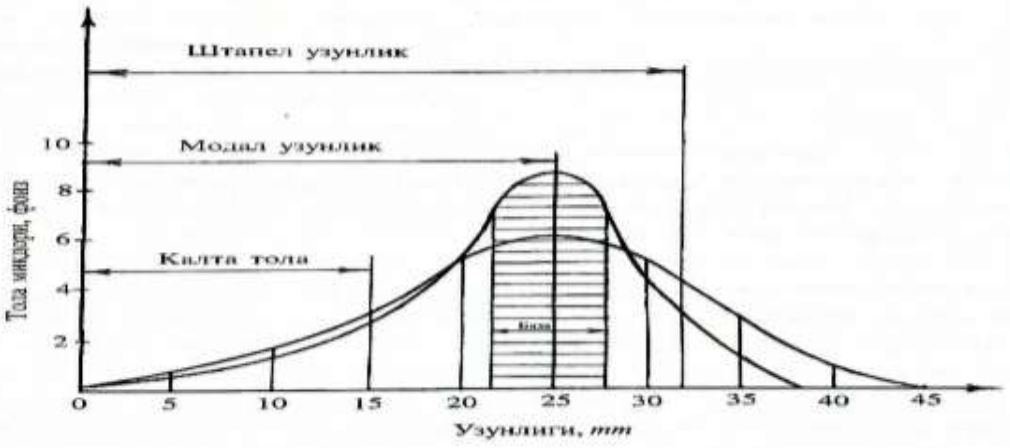

Figure 1.1.1 shows the need to create and install suitable fiber separation devices.

A method of separating seeds that are not completely fibrous

In the coordinated technology of primary processing of cotton [2], the fiber is used in the construction of roller gins in fibrous cotton to separate the seeds that are not completely ginned, while in medium-fiber cotton it is mainly used in various designs of seed cleaning and sorting machines. The separation process can be divided into three ways [9]:

- Separation by air flow;
-Separation in mechanical devices;
-Separation of the material surface according to different properties.

Separation of the seed mixture according to its aerodynamic properties is carried out by air flow. In this case, the air flow must be added in a sufficiently uniform and continuous thin layer. In practice, vertical and oblique air separators are used. The lighter or more volatile fractions are added to the air stream (vertical air stream) and directed upwards and thrown a greater distance than the less volatile fractions. The same method applies to suction airflow. Volatile segregation can also be done in a high-velocity open-field wheat sieve. Fractions with larger mass and less volatility have shorter distances than lighter fractions [28]. There are also CXA seed sorters and UCM-A seed cleaners developed by the Cotton Cleaning IIChB for air separation of seeds [29]. The cross-flow or oblique air flow with the free-falling mixture does not allow the separation of fractions with close volatility with sufficient accuracy, and the aerodynamic properties of fibrous seeds are not sufficiently different from those of low-fiber seeds. A common disadvantage of air-separating machines and separators is that the flow is tubular and the air velocity is not evenly distributed across the width and length of the working chamber. In addition, machines with suction fans, such as those that create a sloping air flow, can be difficult to use indoors due to excessive dusting of the air. Seed mixtures of different sizes are also separated using mesh cages with holes of circular, elliptical and other shapes [30]. The seeds are sorted by thickness on round, perforated, mesh surfaces that increase in length. Many modern seed sorting devices use horizontal vibrating sloping grids. Pneumatic seed cleaners are more widely used in ginneries. The construction of roller coasters used in Uzbekistan and abroad includes a section for the separation of seeds that are not completely fiber-free. An example is the Rotobar roller coaster, a product of the US firm Continental Moss-Gordin [31 ÷ 33]. Separation of non-fiber fibers outside the working zone increases the productivity of the fiber and the quality of the fiber produced. Therefore, a 2PX fiber-free non-ginned seed separator based on the PX cotton separator is recommended for the new roller batteries [34]. Figure 1.2.1 shows a schematic diagram of a 2PX roller coaster battery regenerator that separates fiber-free non-corrosive seeds.

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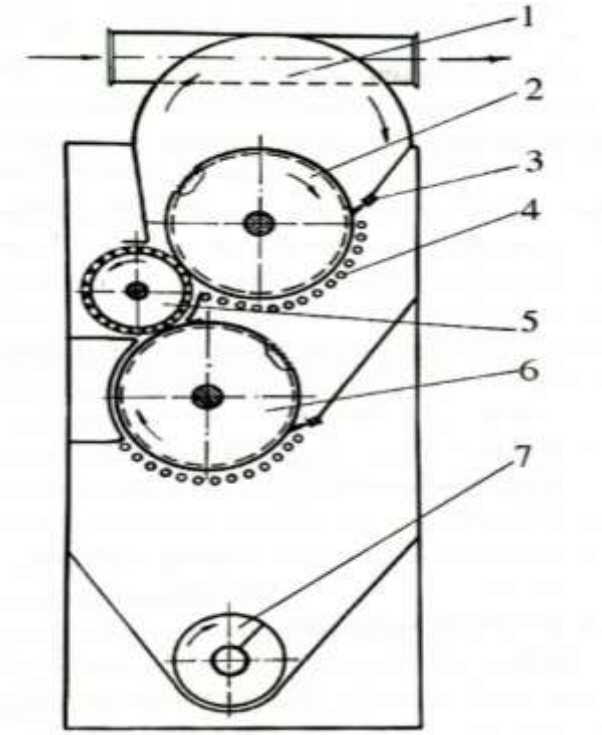
Scheme of 2PX regenerator for separation of fiber-free seeds:



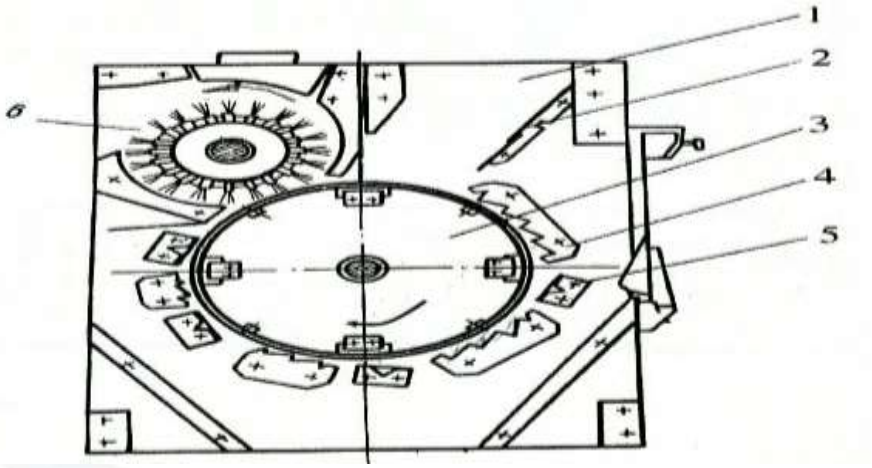
1 inlet hole; 2, 6-arrachali drum; 3 leveling brush; 4-column grille; 5-brush baranan; 7 Separated clean seed conveyors

Figure 1.2.1

The sorted mixture comes to the saw drum 2 through the inlet 1 of the feeder. With the help of the brush 3, it is flattened, and the grate of the crane hits 4, creating a shock-absorbing position. Here, the connection between normal ginned seeds and fibers that are not completely ginned is broken, some of the fibers that are not completely ginned continue to move on the surface of the sawdust drum, and some of the fiberless and fibrous seeds continue to move on the surface of the sawdust drum in the regeneration section. the other part of the fibrous and fibrous seeds falls from the chisel to the saw drum 6 in the regeneration section and the process is repeated. Fibers from a double-saw drum are taken using a single brush drum 5 and directed to the roller drums. Separated fiberless seeds are removed from the device using conveyor 7 [34]. The structure of a fully fiber-free seed regenerator PHC is shown in Figure 1.2.2. It consists of a supply pipe 1, a guide 2, a saw drum 3, a grate grate 4, a guide 5 and a brush drum 6. Incomplete fiber is separated from the mass of incomplete fiber by means of the saw teeth of the drum, and the fiber is returned to the jinn for redistribution. The layout diagram of the PHC fiber regenerator in the ginning and lintering department of the main building is shown in Figure 1.2.3 [10]. The regenerator can be installed on the head of the seed drill auger after the USM-A

pneumatic seed cleaner or elevator. The fiber is transported by air through a tube to the cotton separator of the demon battery or to the KBBB condenser. When the PHC regenerator was used in ginneries, it was found that a small amount of seeds with partially unfinished fiber and spinning fibers were caught. Due to the low efficiency of regeneration, as well as the need for additional equipment (condenser, fan), PHC regenerator has proven to be cost-effective for businesses.

PHC fiber is not a fully regenerated seed regenerator



1 supply pipe; Router 2; 3-saw drum; 4-column grille; Router 5; 6-brush drum.

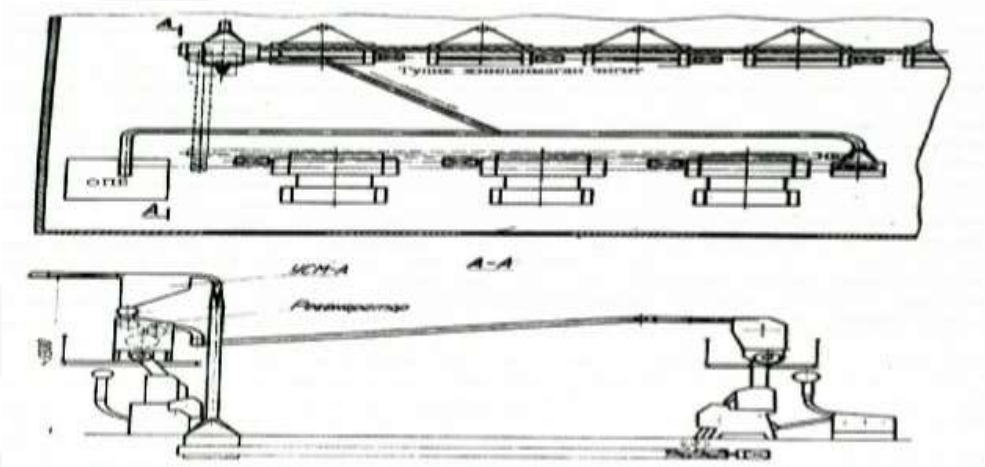


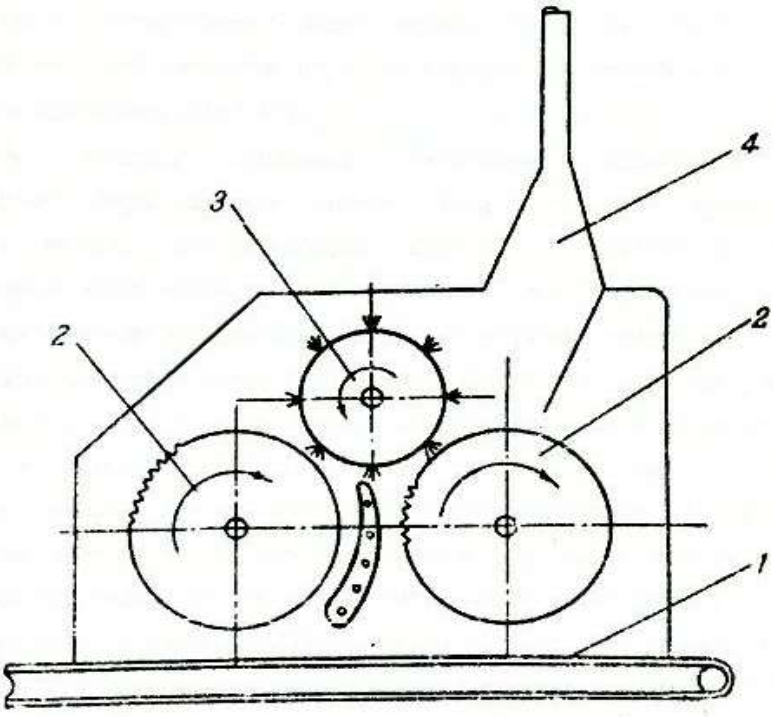
Figure 1.2.2 Location of PHC fiber intact linter in the ginning and lintering department of the main building of the enterprise

Figure 1.2.3

Figure 1.2.4 shows a schematic of a battery regenerator of non-fiber ginned cotton seeds made by Murray at a U.S. ginnery.

The Murray regenerator consists of 2 double-saw cylinders, 10 saws in each cylinder, and 3 brush drums. The regenerator belt is located on the conveyor 1 at a distance of 12.7 mm from the saw cylinder. When this regenerator system was used, it was found

that the fibers could not be clearly separated from the cotton seeds that had not been fully separated from the fibers. First, when a portion of the fiber is returned to the total flow of cotton, using the fiber of the fully ginned seed to the non-ginned seed, the seed is added to the waste along with the impurities between the mesh surfaces under the pile drum in the supply-cleaning part of the gin. Second, it is permissible due to the fact that a portion of the fiber is not completely ginned, but the fiber is added to the total flow of fully ginned cotton seeds [35]. Thus, the analysis of regenerators used abroad and in the Republic shows that they mainly used saws, saws and needles, as well as various grate bars. It should be noted that regenerators of all constructions do not perform the required work. Fiber loss is allowed due to the separation of partially fiber-free seeds from the total seed mixture and seeds with a small amount of fiber capable of spinning. In order to increase the amount of fiber produced without regulating the above analysis, the regenerators separated the fibrous seeds from the post-demon seeds and returned them to the gin.



1 conveyor belt; 2-array cylinder; 3 brush drum; 4 outlet pipe

Figure 1.2.4

One of the most pressing issues is the creation of a new device that can separate additional fibers from spinning fibers.

Seed processing method

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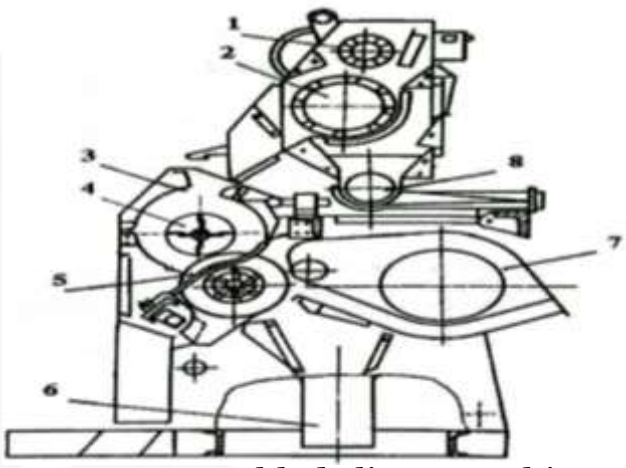
Improving the quality of lint and seeds produced in the lintering department is one of the tasks for the ginning industry. This is because the cost of the product determines the level of profitability of the manufacturer [36 ÷ 41].

One of the main machines in the technological process of the ginnery is a saw linter, which is characterized by its complexity, large number in the lintering shop, difficulties in timely replacement of saws, high consumption of spare parts and electricity.

Currently, the industry uses sawed linter machines PMP-160, 5LP-M (Figure 1.3.1). The working chamber of these machines was changed to an improved UMPL chamber [42], the outer diameter of the rotary-accelerator in the chamber was enlarged to 160 mm, the number of blades in the rotating-accelerator was 4, the spacing of the blades with a saw tooth according to cotton selection and varieties. 9-12 mm and a rotational speed of 500 m / min, it is recommended that the saw cylinder rotation speed be 730 m / min and the nozzle spacing with the saw tooth be 1.5 mm to 2.5 mm.

Due to the use of UMPL working chamber on the saw linter machine, the machine productivity on the seed (about 2.5% of the wool is separated) is 1400 ÷ 1800 kg / s, and on the wool 35-45 kg / s. The total power used in the production of the product. The total power used in the production of the product is 30.6 kW, of which the supply system is 4.4 kW. The design of the machine support system (Figure 1.3.2) is a more important fact than the previous ones, in that the supply roller 1, the leveling-cleaning pile drum 2, and



5LP saw blade linter machine

1 supply roller; 2 leveling-cleaning drum; 3-seeded camera; 4 accelerator rollers; 5-arrali cylinder; 6 dead tubs; 7 air chambers; 8 Auger for dirt

Figure 1.3.1

KPP supply-cleaning system

1-supply; 2nd leveling-cleaning drum; 3-mesh surface; 4 waste auger

Figure 1.3.2

Seed cleaning net 3, waste auger 4 are used. During its operation, the seed is first transferred to the supply roller. The seeds are then cleaned of small and large contaminants by passing them between the pile drum and the net. In addition, the movement of the drum ensures that the piles are spread out and fed evenly to the working chamber due to the spontaneous action of the piles on the seed. Despite the improvements in machine design, it is characterized by high consumption of metal and spare parts, problems with the timely replacement of saws in the saw shop, and high consumption of electricity.

In addition, in the cleaning part of its supply system, the seed is compressed and processed by the mechanical force transmitted by the drum pins as it moves between the mesh surfaces due to the rotational movement of the leveling-cleaning drum, which increases its mechanical damage. This leads to an increase in its level of contamination when the fluff enters the seed. The increase in mechanical damage had a negative effect on the fat content in the technical seed and on its yield in the seed [43].

The aim of scientific research in this area is to introduce a scientific and practical approach to lintering technology, low-cost, high-quality sawdust linter machine and the method of preparation of ginned seeds for the lintering process.

1.4. Summary

1. Nowadays in industry after jinn (3XDDM, DP-130, 4DP-130, 5DP-130) the fiber is separated from the seeds and the fiber is separated from the seeds and returned to the jinn. Production of quality products at low cost in the technological process, streamlining of the technological process remain topical issues.

2. Dedication (3XDDM, DP-130, 4DP-130 vz 5DP-130) to the technological process of sorting and regeneration, (PX, 2PX and PHC) linterlah, which separates the seeds from the post-demon, the fiber is not completely ginned The following issues of theoretical and practical significance have not been fully resolved:

2.1. Aerodynamic sorting devices do not have sufficient accuracy in separating seeds into 3-4 fractions. In addition, the energy and material gap in the use of these devices is huge.

2.2. Mechanical sorters with a saw blade do not sufficiently separate the fine-grained and non-fibrous grains from the seed mixture.

2.3. Mechanical screens with mesh holes in the sorting grid, the seeds are often stuck in the mesh holes at the same time as the seeds are not completely separated from the

fiber mixture at low efficiency. This, in turn, creates a number of problems in their operation, management and maintenance.

3. The task and purpose of the research is to increase the fiber yield by completely separating the spinning fibers from the original cotton seed, increase the staple mass length of the fiber, reduce fiber defects and dirty sawdust and wool content, spin and mechanical damage of the seed. In order to achieve high efficiency of linter, the process of ginning is carried out in two stages with different rollers of different densities, and the process of lintering is carried out by softening the epidermis layer of the seed at the expense of additional moisture.

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