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# **Study of the Effect of the Gap between the Saw Blade and a Bar of Gin Air Chamber**

**T.M. Kuliev, K.S. Sabirov, R.S. Sulaymonov, D.U. Madrakhimov, I.K. Sabirov**

PhD of Economic Sciences  
Doctor of Technical Sciences  
PhD. Doctor of Technical Sciences  
PhD of Technical Sciences  
JSC "Pakhtasanoat research center", Tashkent, Uzbekistan

**ABSTRACT:** The article presents the results of experimental studies on the effect of various gap clearances (openings) between the saw cylinder and the beam of the gin air chamber on the quality of the products and its performance.

**KEYWORDS:** gin, working chamber, saw cylinder, grid bar, timber, air chamber, fiber removal, shaft, seed cotton, density of raw roller, seed damage, broken seed, seed skin with fibre

## **I.INTRODUCTION**

All industrial varieties of medium-fibre raw cotton are processed on saw jeans.

In the gin section of the cotton processing plant there is one battery of ginseng equipped with 2 or 3 ginseng 4DP-130 (or 5DP-130), or 2 ginseng DPZ-180, or 3 or 4 ginseng 7DP-90 [1].

The air chamber of jeans serves for removal of a fibre from teeth of saw cylinders after its removal from the working chamber behind a grate. The working organ of the air chamber is a nozzle, which has a 5 mm slot across the width of the gin and is equal to the length of the working chamber of the gin. The distance between the teeth of the saws and the nozzle must not exceed 1.2 mm [2].

With the introduction of 130 saw jeans at the cotton-cleaning enterprises of the republic, a technical gap between the saw cylinder and the bar of the air chamber 1-3 mm was set [3].

The main technological requirement for the air chambers is to ensure that the fiber is completely removed from the teeth of the saws and fed into the gin fiber spigot. Unsatisfactory removal of the fiber leads to its deterioration due to repeated dragging into the working chamber through the grate.

In order to solve the problem of the influence of the gap between the saw cylinder and the bar of the gin air chamber of 1-3 mm on the removal of fiber from the teeth of the saws and its supply to the fiber branch pipe of the gin in the laboratory conditions of JSC "Pakhtasanoat research center" on the 30-pillar gin experimental studies were carried out in the process of jeansing raw cotton of the selection grade Namangan-77 of the first grade, first class.

For carrying out of experimental research of definition of weight of a pilot batch of raw cotton proceeded from capacity of a working chamber and mine. The volume of the working chamber made it possible to load raw cotton in the amount of 14 kg, at the density of the raw roll of  $310 \text{ kg/m}^3$ , and 21 kg of raw cotton were placed in the mine.

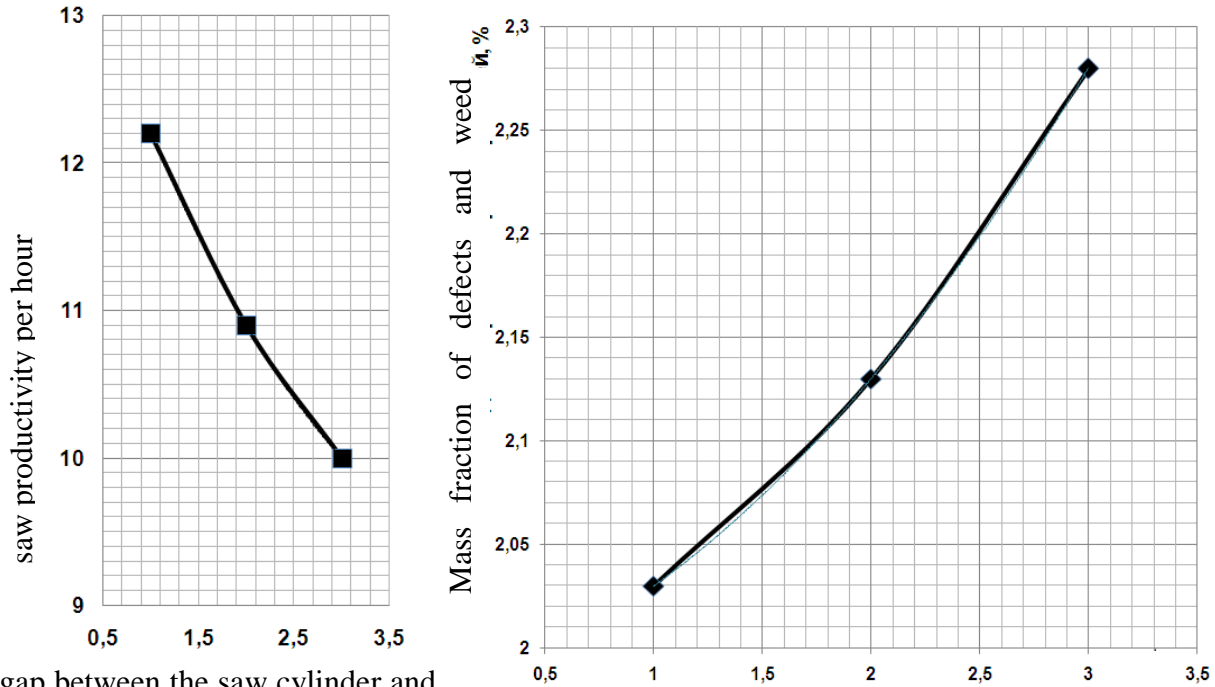
Proceeding from this, the mass of the experimental batch of raw cotton is assumed to be 21 kg, with three multiple repetitions of each experiment.

The results of the conducted experimental researches are given in the table.

**Table 1**

№	Indicator	Saw cylinder and air chamber bar, mm		
		1	2	3
1	Raw cotton raw material			
1.1	Humidity, %	7,0	7,0	7,0
1.2	Obstruction, %	2,6	2,6	2,6
1.3	Seed damage, %	0,1	0,1	0,1
2	Raw cotton in front of the gin			
2.1	Humidity, %	7,0	7,0	7,0
2.2	Obstruction, %	1,0	1,0	1,0
2.3	Seed damage, %	0,9	0,9	0,9
3	Fiber performance per saw per hour, kg	12,2	10,9	10,0
4	Fiber after gin:			
4.1	Mass fraction of flaws and weedy impurities, %	2,03	2,13	2,28
	including:			
4.1.1	Selected large variety	0,57	0,57	0,57
4.1.2	Ulug	0,50	0,50	0,50
4.1.3	Battered seeds	0,30	0,35	0,42
4.1.4	Combined flagellas	-	-	0,03
4.1.5	Leather with fibre	0,25	0,30	0,35
4.1.6	Small trash	0,41	0,41	0,41
4.2	Staple mass length, mm	31,6	31,4	31,2
4.3	Type	5	5	5
5.	Seeds after gin:			
5.1	Damage, %	2,32	2,32	2,41
5.2	Vulnerability, %	11,0	11,1	11,2

By results of experiment dependence of influence of a backlash between a saw cylinder and a bar of air chamber of a gin on indicators of productivity on a fibre, and also a mass fraction of defects and weed impurity which graphic is given in figure 1 is adjusted.  
saw productivity per hour



The gap between the saw cylinder and the beam of the air chamber.

The gap between the saw cylinder and the beam of the air chamber

Figure 1 - Influence of the gap between the saw cylinder and the gin air chamber bar on the performance indicators and the mass fraction of defects and weedy impurities

*a* - productivity; *b* - mass fraction of defects and weedy impurities

As a result of processing of results of experiment by a method of the regression analysis the mathematical model of dependence of influence of a backlash between a saw cylinder and a bar of air chamber of a gin on parameters of productivity on a fiber is received

$$y_1 = 0,2x^2 - 1,9x + 13,9 \quad , \quad (1)$$

where  $y_1$ -fiber capacity per saw per hour, kg;

$x$  - Gap between saw cylinder and air chamber bar, mm

as well as the mathematical model of the influence of the gap between the saw cylinder and the bar of the air chamber of the gin mass fraction of flaws and weedy impurities, which is described by the following equation:

$$y_2 = 0,025x^2 + 0,025x + 1,98 \quad , \quad (2)$$

where  $y_2$  - mass fraction of defects and weedy impurities, %

The analysis of the data presented in the table and the graphs in Figure 1 showed that with the gap between the saw cylinder and the bar of the air chamber of 1 mm, the capacity per saw per hour is 12.2 kg, and with the gap of 3 mm it decreases by 2.2 kg per saw per hour and amounts to 10.0 kg. The same situation is observed with the mass fraction of defects and weedy impurities in the fiber after the gin at 1 mm-2.03%, and at 3 mm - 2.28%. Mainly the mass fraction of defects and weedy impurities in the fiber increases due to the increase of such fractions as broken seeds, skins with fibers and the formation of combined flagella, and this in turn is associated with an increase in damage to ginned seeds, as well as the re-pulling of fiber by the saw cylinder into the working chamber through the grate.

Especially it is necessary to notice that at jeaning of backlashes of the saw cylinder and a bar of the air chamber in 1mm - staple masodlin of a produced fiber makes 31,6 mm, and at 3 mm - decrease on 0,4 mm and makes 31,2 mm, that is its value becomes limiting for a fiber of 5 type according to O'zDSt 604:2016.

## II. CONCLUSIONS

Recommended distance between the teeth of the saw cylinder and the air chamber bar (gin nozzle) 1-2 mm



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