



Improved Grate for Gins and Linters

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Abstract

In article are brought given about new way of the fabrication gin and linter ribs and about result of the study of the change to hardness their worker zones after processing on new way.

Keywords: Cotton industry; Ginning process; Gin; Linter; Grate

Introduction

As is well known, at present, saving electricity is one of the priorities of all types of production where it is consumed. Also, one of the ways to improve production efficiency is the production of products at a low cost [1-3]. In the cotton ginning industry, the largest share of the cost of purchasing bulk spare parts falls on gins and linters, in particular for the purchase of grates for these two machines [4-6].

In gins and linters, the grate is assembled from separate cast-iron gin grates, between which the gin saws rotate. The gaps between the individual grates are strictly limited, because a decrease in the gap leads to the contact of the saw cylinder saws with the grates and rapid wear of the grates, and an increase in the clearance leads to seed escape along with the fiber, as well as damage and shortening of the fiber.

During the operation of the gin, intensive wear of the grates in the "working zone" occurs due to the friction of the fiber on the grate and the contact of the saws to the grates. Therefore, the

service life of cast iron grates - one of the high-wearing parts - is, at best, no more than one season of operation.

Until now, in domestic practice, gin and linter grates are cast from gray or synthetic cast iron, because they have a complex cross-sectional shape and a complex configuration. With this method of production, they have a high labor intensity and naturally have a high cost [7-9]. Joint research by specialists from the Uzpakhtasanoat Association and the Russian enterprise CJSC Step-Holding has developed a new method for the manufacture of grates from rolled steel. The implementation of this method is recognized as an invention and a patent of the Republic of Uzbekistan was issued for it (RUz No.02064) [10-12].

The proposed method is implemented as follows. The billet (round steel rolled metal) is rolled on a mill with a four-roll or three-roll caliber into a profile corresponding to the cross-section of a gin grate, on a press in a stamp, it is given the required shape of bends along its length and subjected to mechanical processing. To implement this technological process, an order was placed for

the manufacture of the necessary technological equipment in the closed joint-stock company Step-Holding, Chelyabinsk, Russian Federation. The manufactured set of equipment was mounted in the workshop of the "Bektemir" section of the Experimental Mechanical Unitary Enterprise JSC NPO "Paxtatozalash" [13-18].

The proposed technological process is carried out as follows: first, steel, rolled metal blanks with a diameter of 18mm were cut to lengths (2m), and then the blank was heated to the temperature of plastic deformation (950-1000oC) in electric furnaces, which made it possible for rolling get the required profile. Then the billet is rolled on the MK-230 mill equipped with three or four-roll calibers at a speed of 1m/s and the length of the profile increases by one and a half times, i.e., up to 3m. The obtained profiles are cooled on special racks and straightened on a straightening machine in a cold state. After that, the profile was measured to fit the size of the grate, the working surface of the grate was cleaned by grinding or milling, bending along the length on special dies installed in the press, forging the ends in a state heated to 900oC, and then the seating of the seating surfaces at the shanks using a special device, drilling holes for fasteners and hardening of the working surface by heating on a high-frequency current unit up to 860oC, followed by cooling in water or oil.

The advantages of the new method of making gin grates are as follows:

1. Reducing the cost of gin and linter grates by about half.
2. A significant increase in the strength of the grate due to the use of steel instead of cast iron, which has low strength and high fragility.
3. A significant reduction in the labor intensity of the grate production due to the use of a high-performance rolling process in three or four-roll calibers instead of a long and multi-stage casting process and, accordingly, a decrease in the production cost.
4. Increased maintainability, since multiple surfacing and spraying with hard alloys and high-strength electrodes can be easily performed on a steel surface.
5. Installation and adjustment of the grate is greatly facilitated, because steel grates can be adjusted by plastic bending, which is completely unacceptable on cast iron grates.

Conclusion

1. A new method of manufacturing gin and linter grates has been developed, the novelty of the technical solution is confirmed by a patent for an invention.
2. The study of the structure of the working area showed the presence of changes in it corresponding to an increase in wear resistance.
3. Operation of gin and linter grates made according to the new method at the enterprises of the cotton ginning industry has confirmed their high efficiency and reliability in operation.

Acknowledgement

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Conflict of Interest

None.

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