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Research Article

EXPERIMENTAL ANALYSIS OF MASS EXCHANGE PROCESSES IN THE CONTACT ELEMENT GENERATING DEVICE

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ABSTRACT

Cleaning of harmful dust and gases generated in technological processes today is one of the important tasks of this day. Therefore, the main working factors affecting the cleaning process were determined in the experimental model of the newly developed contact element accumulative flow generator. The gas velocity, gas and liquid consumption in the apparatus, the length of the liquid film and the working surface were determined based on experiments.

KEYWORDS

Contact element, lumped flow, cleaning process, liquid and gas consumption, flow mode, coefficient of hydraulic resistance.

INTRODUCTION

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Leaf contact elements of different slopes were selected for the apparatus, which creates a lumped current. Based on the conducted theoretical and experimental studies, preliminary requirements for the device and technical tasks were developed.

The following necessary equipment and devices were selected for the experimental model to determine the length of the liquid film through the gas velocity, liquid and gas consumption, flow regime and hydraulic resistance coefficients in the wet dust collector and gas cleaning apparatus (Fig. 1) [1-7].

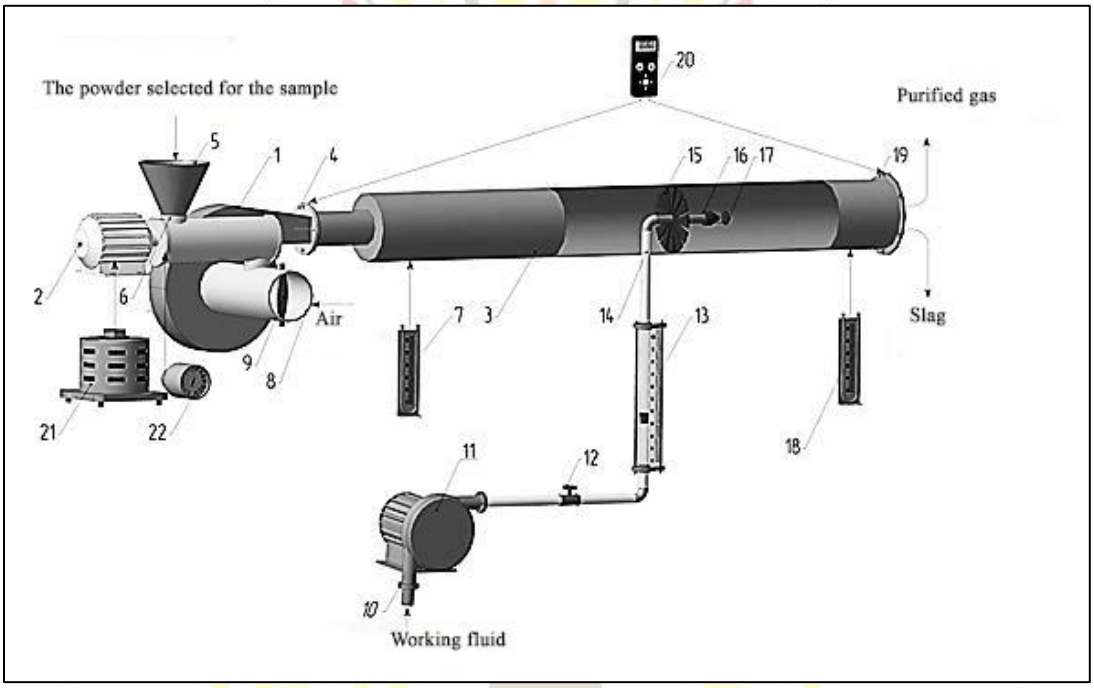

Figure 1. Overview of the device.

S32412 nozzle (hole diameter 2; 2. 5 and 3 mm nozzle according to GOST-384610), centrifugal pump (PEDRJLLA - Q_{max}) for spraying liquid into the working chamber of the device=40 l/min; N_{dv}=0. 37 kW; N_{max}=38 m; V=220 V; pipe =3000 rev/min according to GOST-2757030-91), a rotometer (PC-5; scale indicators in the range 0÷100; according to GOST-1304581) was selected. The length of the liquid film depending on the diameters of the nozzle holes and gas velocities was determined for the variation of liquid and gas consumption. Experiments were conducted in the following order [8-11].

To supply dusty gas to the working chamber of the devices-VS-14-07 centrifugal type fan; productivity Q_{max}=400 m^3/h; electric power N_{dv}=1. 5 kW; the number of revolutions n=1200 rev/min; Pitot Prandtl tube is 100 mm in size; According to Gosreestr #50123-12; The gas velocity detector consists of a metal pipe with

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D=100 mm, L=1200 mm. 2 Prandtl tubes with an inner diameter of 7 mm, which determine the static and dynamic forces in the pipe, were selected as the experimental model, respectively.

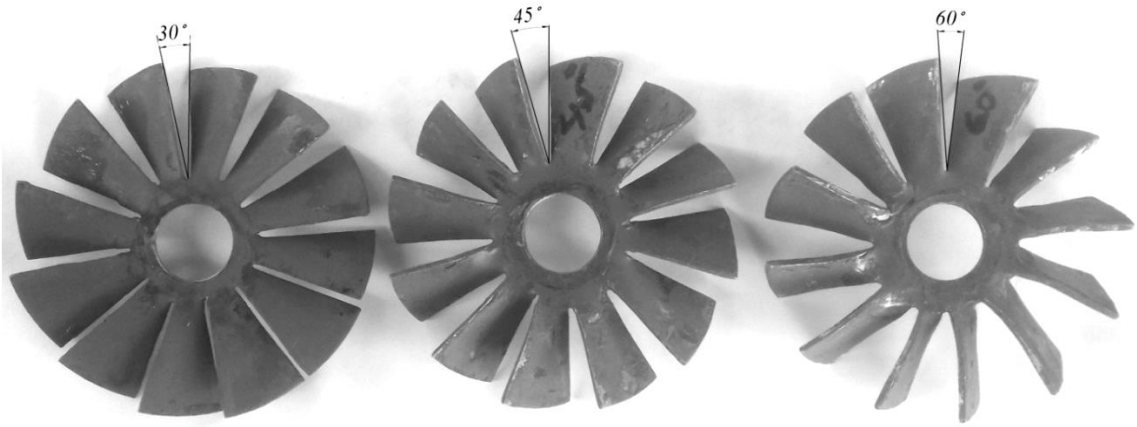

Figure 2. 30 degrees; Overview of 45o and 60o contact elements.

Gas velocities and contact elements(zavikhritel) depending on the change of slope angles and the length of the liquid film were determined through resistance coefficients. Figure 1, 2 30 degrees; 45o and 60o contact elements are provided. Experiments were conducted in the following order [2,3].

Gas velocities depending on changes in liquid and gas consumption supplied to the device, angle of inclination of contact element pieces(zavikhritel) a=30o; 45o and 60o and the diameter of the nozzle hole dsh=2; Experiments were conducted to determine the length of the liquid film formed in the working chamber when 2. 5 and 3 mm. Liquid consumption according to the results of the experiment when the rotometer scale shows 0÷100 and the length of the liquid film formed in the working chamber of the apparatus when the gas velocity is up to yg=7. 07÷28. 37 m/s is 30÷It was found to be 335 mm. In experimental studies, liquid film growth averaged 12÷showed an increase in the range of 16 mm.

CONCLUSION

From the experiments carried out to study the effect of the length and thickness of the liquid film on its cleaning efficiency through liquid and gas consumption, gas velocity and hydraulic resistance, it can be concluded that the increase in the angle of inclination of the contact element blades that move the gas flow in the apparatus ensured the thickening of the liquid film layer. But it led to a decrease in the working surface. On the contrary, the decrease in the angle of inclination of the contact element blades led to an increase in the length of the liquid film and an increase in the working surface. With this, by increasing the length of the liquid film in the working chamber of the device and increasing the working surface,

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the high efficiency of dust gas cleaning and the improvement of the massing process was achieved.

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