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Development of Stages of Research of Parameters of Working Bodies of Existing Technological Equipment at the Enterprise Ooo "Karbonam"

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Abstract: Design features - Mixers with Z-shaped blades, in addition to the latter, are equipped with a frame and a special container installed on it. Inside, there are two shafts, each of which has a different shape, they are set in motion by starting the engine. The container of the Z-shaped mixer is equipped with a hinged lid and a special device that facilitates lifting. Depending on what ingredients need to be mixed with such a device, additional hatches and pipes are built into the upper part to facilitate loading.

Design features - Mixers with Z-shaped blades, in addition to the latter, are equipped with a frame and a special container installed on it. Inside there are two shafts, each of which has a different shape, they are set in motion by starting the engine. It is known from the literature that the influence of the movement of equipment along the Z-shaped type of equipment on the quality indicators of the resulting products during their distribution was observed.

Designed for intensive mixing, kneading and plasticization of products with high and especially high viscosity. Mixers ZL, mixers ZSh are designed for the preparation of liquid, viscous, pasty and plastic mixtures in the chemical, polymer, pharmaceutical and food industries, the building materials industry. Typical products for Werner mixers: rubber adhesives and sealants based on synthetic, natural and silicone rubber, paints, putties, ceramic masses, metal powder, PVC masses with fillers, composite materials, alkali cellulose, carbon electrodes, explosives, pharmaceutical and food products, wood-polymer materials.

Now, together with technical specialists working in this field, we will tell you about how Z-shaped mixers work.

Mixers with Z-shaped blades are widely used in various industries where it is necessary to prepare thick mixtures of high viscosity. They are used in those enterprises where significant force must be applied for mixing.

Operating principle - Ingredients are loaded into stainless steel tanks of this type of mixers through a special opening. The shafts of such a device have a special Z-shape, due to which the rotation zones overlap each other during operation, and therefore move with great force, mixing the product as thoroughly as possible. During mixing, the components are concentrated mainly in the middle part of the mixer, where they interact with each other most intensively.

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The use of large Z-shaped blades in combination with high torque transmitted to the shafts allows for high-quality mixing performed as quickly as possible. The design itself is highly reliable, and therefore this type of device can be used repeatedly, including where oil and gas equipment is used.

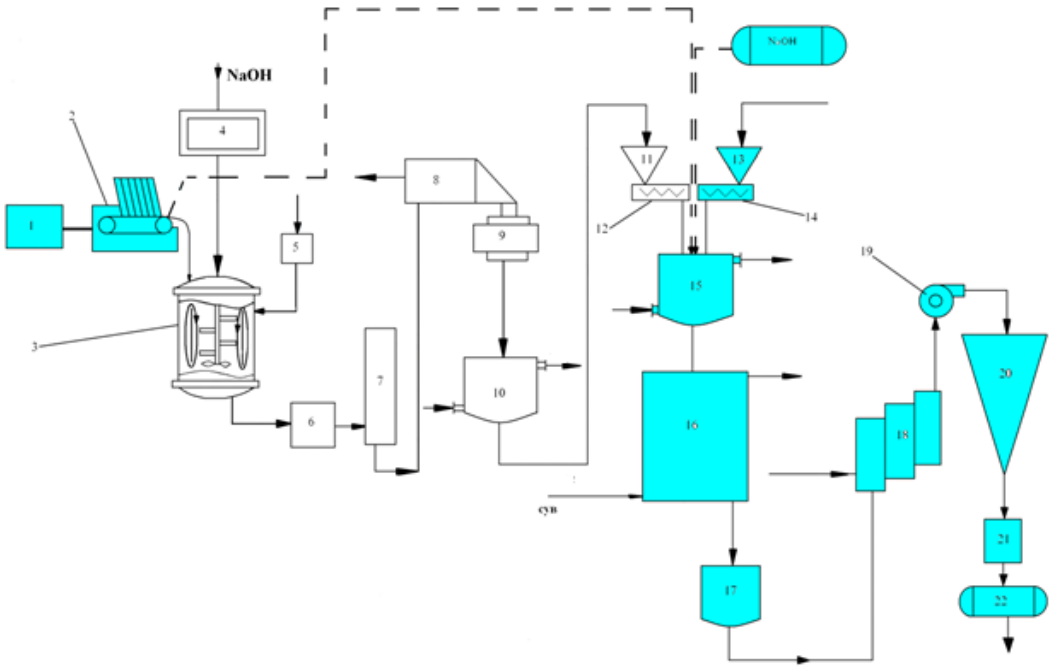
Additionally, the kit includes a special control panel, thanks to which you can fully control the operation of the mixer. As a result, in addition to standard components, the control panel is equipped, if necessary, with sound and light alarm systems, timers, devices measuring the rotation frequency of the shafts and other devices.

Despite the fact that such equipment is among the simplest, its effectiveness has been proven repeatedly in the practice of many enterprises, and therefore it is still used in a wide variety of areas, from the food industry to oil production.

It is known from the literature that the effect of moving equipment along the Z-shaped type of equipment on the quality indicators of the products obtained with its participation was observed. Based on the results of the above developments, our research and development work, the study of the parameters of the existing working bodies of the process equipment at the enterprise OOO "KARBONAM", the inclusion of additional elements in their composition, contributed to the production of high-quality and cost-effective equipment. . forced to master the stages. In this section, that is, devoted to the development of the main parts of the mixer of the new design of the

"MONAPPARAT" machine, which is currently in production, below are the studies on the development of the stages of the study of the parameters of the working bodies, the replacement of the existing process equipment at the enterprise OOO "KARBONAM". There are several methods for the production of CMC, which are developed as a result of research aimed at a high degree of polymerization, a high degree of substitution, in general, high positive results. Scientific research was conducted to obtain CMC of several grades for various industries.

The following basic diagram of the production of CMC represents the sequence of the current technological process:



1-roller conveyor; 2-feeder conveyor; 3-mercerizer; 4-filter; 5-tank for providing the required amount of alkali; 6-mass pump; 7-pressure gauge; 8-compression press; 9-apparatus for crushing alkaline cellulose; 10-device for cooling alkaline cellulose; 11-tank for collecting alkaline cellulose; 12-doser; 13-NaMXУK collector; 14-NaMXCK doser; 15-apparatus for mixing NaMXCK with alkali cellulose; 16-reactor for maturing CMC; 17-reactor for transferring CMC; 18-drying unit; 19-fan; 20-cyclone; 21-mill; 22-packaging unit NaMXУK – sodium monochloroacetic acid. Figure

4.1. Basic flow chart of obtaining PAC in practice

According to the scheme, the cellulose is fed to the meerser apparatus via a conveyor belt. Here, the cellulose is subjected to messerization using a sodium alkali solution. The alkaline treatment of cellulose is carried out at 14-16 °C. Then, the alkaline cellulose undergoes a compression stage on a press to a certain extent, is softened and fluffed.

$$C_6H_7O_2(OH)_3 + xNaOH \rightarrow C_6H_7O_2(OH)_{3-x}(ONa)_x + xH_2O$$

The resulting alkyl cellulose, i.e. alkali cellulose, is cooled and placed in a Werner-Pleiderer apparatus. Here, the process of carboxymethylation of alkali cellulose with monochloroacetate takes place. This reaction is called alkalization.

Because the OH group of the sixth carbon in the cellulose macromolecule is located far from the glucoside cell, it is initially replaced, i.e. undergoes carboxymethylation. If the molar ratio of cellulose and sodium chloroacetate increases, the OH groups of the second and third carbons also participate in the alkylation reaction.

Carboxymethylation continues for a certain time. Then the semi-finished product is transferred to a maturing reactor. Here, as a result of exothermic reactions, CMC matures.

$$C_6H_7O_2(OH)_{3-x}(O\,Na)_x + C1CH_2COONa \rightarrow$$

$$C_6H_7O_2(OH)_{3-x}(OCH_2COONa)_x + xNaC1$$

The mass temperature rises to 90-100 °C. The process of obtaining CMC is completed by delivering the final product to the warehouse after it passes through a drying unit and a grinding mill.

As a result of the research, a simplified method for obtaining CMC was developed. In accordance with it, previously used technological methods were excluded from the technological scheme. According to the developed technology, cellulose directly enters the mono-apparatus. Here, cellulose is treated with an alkaline solution in the required ratio and undergoes mercerization, cooling of alkalized cellulose. The alkalization process is carried out sequentially. The resulting semi-finished product matures, dries, undergoes grinding in a mill and is sent to the finished product warehouse. A separately highlighted part of the above scheme refers specifically to the simplified technological process of CMC production, and in accordance with it, the reconstruction can be sequentially carried out at the enterprise itself.

In organizing the production of CMC with high quality indicators, various reactions taking place in the technological process are of paramount importance. One of such characteristic reactions is the production of alkali cellulose, i.e. the production of alkyl cellulose by reducing destructive phenomena and implementing the mercerization process. The reactivity of cellulose is determined by the packing density of its macromolecules, orderliness or ease of interaction. At the initial stage of the synthesis of any cellulose ether, i.e. CMC ether, in order to increase the reactivity of cellulose, it is subjected to alkaline treatment. In turn, in the cellulose macromolecule, the destruction of elementary cells occurs. It is known that carrying out the mercerization process at low temperatures has a positive effect on the degree of polymerization of cellulose and on all the quality indicators of the CMC obtained on its basis. Figure 4.1 shows the basic diagram of the existing technological facilities of the KARBONAM plant. Here is the general existing technological sequence, showing in separate colors the reduction of several units of equipment in the existing technology and the introduction of a new composition of additional parts in the working bodies as a result of extensive research. That is, from the sequence of the existing process equipment, 5-tank for providing the required amount of alkali; 6-mass pump; 7-pressure meter; 8-press for compression; 9-apparatus for crushing alkaline cellulose; 10-device for cooling alkaline cellulose; 11-tank for collecting alkaline cellulose, we blocked the contents of the equipment from the system network.

5-tank for providing the required amount of alkali; 6th machine; 7-pressure meter; 8-press for pressing; 9-apparatus for producing alkaline cellulose; 10-regulator for cooling alkaline cellulose; 11-tank for collecting alkaline cellulose, such as an additional device and a reduction in its working bodies, was carried out positively due to the improved aggregate device, which is called "MONOAPPARAT" for all processes. Its improved parts in a short period of time achieved high efficiency of product quality and the necessary mechanical destruction of the working bodies of the equipment.

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