INNOVATIVE SOLUTION FOR BIOGAS PRODUCTION

Saloydinov Sardorjon Qodirjon o'g'li
Assistant at Namangan Institute of Engineering and Technology

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Abstract: *The article presents the rationale for the relevance, scientific novelty and practical significance of the proposed control system for a multi-chamber reactor. Variants of comparison with similar foreign solutions are proposed.*

Keywords: *multi-chamber reactor , control system, mixing, heating, supply and unloading of raw materials.*

ИННОВАЦИОННОЕ РЕШЕНИЕ ДЛЯ ПРОИЗВОДСТВА БИОГАЗА

Аннотация: *В статье представлено обоснование актуальности, научной новизны и практической значимости предлагаемой системы управления многокамерным реактором. Предложены варианты сравнения с аналогичными зарубежными решениями.*

Ключевые слова: *многокамерный реактор, система управления, смешение, нагрев, подача и выгрузка сырья.*

INTRODUCTION

Each of us throws away a huge amount of garbage and waste. So, the average city dweller throws out more than 360 kg of solid household waste per year. And this is only waste, so to speak, of an individual consumer. This does not include construction or industrial waste. According to experts in the republic, the amount of waste from industrial and domestic areas is 100 million tons. And the share of household waste is 35 million tons. In every million tons, 360 thousand tons of food products, 160 thousand tons of paper and cardboard, about 55 thousand tons of textiles, about 45 thousand tons of waste from plastic and other components. But of these, only 2% is recycled [1].

MATERIALS AND METHODS

At present, in the example of the Ferghana the region generates an average of 3.5 tons per day, 105 thousand tons per month and 3 million 260 thousand tons of household waste per year. If all the garbage thrown out for a year, for example, by the inhabitants of Ferghana, distributed in an even layer throughout the city, the thickness of this layer would be about 7 centimeters. In order not to drown in piles of garbage and not be poisoned by the products of its decomposition, it must be disposed of somehow [2].

With an increase in the production capacity of livestock enterprises, the number of livestock breeding substrate is also increasing, which is subsequently thrown onto the fields as fertilizer, or becomes a raw material for biogas plants [3]. In a biogas reactor the mixing system, as a rule, is a beam with blades.

The reactor itself is an integral container in which the entire fermentation process takes place in a single mode of mixing and heating. This is in contradictions with the fact that at the early stage of fermentation, intensive mixing and heating is required to prevent the formation of crusts and penetration of bacteria into the substrate, but at a late stage intensive mixing and heating damages the efficient biogas output, and the continuous operation of electrical equipment leads to excessive consumption of energy resources.

The presence of microprocessor tools integrated into the operation of the reactor for automated operation can increase the efficiency of anaerobic digestion, reduce energy consumption, and also allow for control over Thus, the development of a system for controlling

the modes of mixing and heating of biomass in a multi-chamber biogas reactor for continuous loading of raw materials is necessary and urgent today.

RESULTS AND DISCUSSION

The design and control system of a multi-chamber biogas reactor for continuous loading of raw materials [4-6].

Figure 1 shows the design of a multi-chamber biogas reactor for continuous loading of raw materials. The control system for mixing and heating modes is a head microprocessor with preset parameters for the operation of electrical equipment, an executing relay, a set of sensors mounted in different operating chambers For effektivnoy eksplyatatsii nA obektah APK neobhodimo chtoby at stroitelstve dannogo commentsObject galleries nA stadii razrabotki proektnoy dokymentatsii was ychten The complex is pererabotki othodov in biogaz, ychtena logistika raw podvedeniya in predvaritelnyyu byfernyyu emkost for their podogrevaniya, peremeshivaniya with zhomom and zagryzki in biogazovy reaktor. Mnogokamerny biogazovy reaktor nepreryvnoy zagryzki raw material is modylnoy konstryktsiey, verily there slychae vyvoda ego of raboty, naprimer nA tekyschy remont, there tehnicheskaya vozmozhnost ostavit biomassy in odnoy or dvyh kamerah reaktora in verily time kak at dvyh ostavshihsya kamerah mozhno provodit reglamentnye raboty.

Technical solutions closest to the proposed development Produced by Farmatic. In this solution, there is no division of the container into chambers, which makes fermentation ineffective due to the lack of the necessary temperature and mixing for the substrate of a different phase of fermentation. In the sample under consideration, there is only one pair of agitator blades, which leads to the formation of crusts in the substrate and a low biogas yield. Also, the competitor's solution provides for biomass heating, only one position for the entire tank, some of the biomass is heated excessively, and some does not reach the required temperature. This solution is inefficient due to the low yield of biogas, as well as due to the high consumption of energy resources. In the proposed system for controlling the modes of mixing and heating of biomass in a multi-chamber biogas reactor for continuous loading of raw materials, all the shortcomings of the main competitor will be taken into account and corrected.

The control system is integrated into the waste processing complex, containing a container made of polyvinyl chloride, thermal insulation protection electric drives, agitator blades, heating elements, cable kanaly, Kensington with kompressorom, zakachivayuschim massy of raskhodnoy emkosti in reaktor, Kensington with kompressorom for otkachivaniya otrabotannogo feedstock in emkost ydobreny, Kensington with kompressorom for otkachivaniya biogaza in gazgolder, datchiki temperatyry, termorele, mikroprotsessor. The complex uses an efficient design of the reactor, which allows you to set your own chemical environment in each chamber, set the heating interval, the level of mixing. It is known that anaerobic digestion of biomass takes place in several phases, each of which is characterized by certain temperature and mixing regimes. This is the most advantageous difference between the proposed solution and the solutions of the main potential competitors - the company Farmatic, which offers steel single-chamber solid reactors with 1 electric drive and 1 pair of agitator blades.

This is inefficient, since the substrate fermented for several days will mix with the newly arrived one, and the temperature of the entire biomass will be the same.

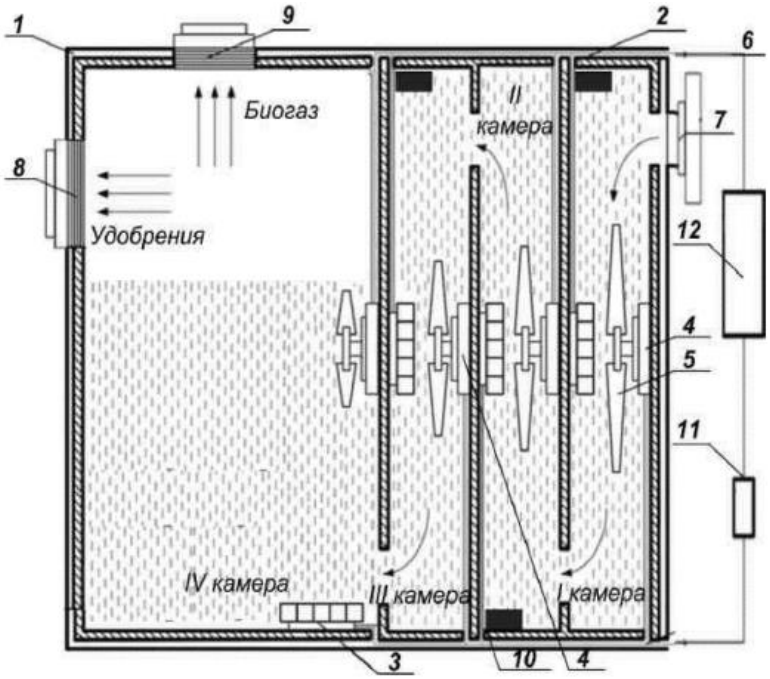

Figure 1 - Multi-chamber biogas reactor for continuous loading of raw materials with the proposed system for controlling the operating modes of electrical equipment:

1 - reactor capacity; 2 - thermal insulation protection;

3 - heating device; 4 - motor of agitator blades;

5 - two-bladed mixer; 6 - power and information cables;

7 - pump for biomass injection; 8 - pump for pumping out fertilizers;

9 - compressor for pumping out biogas; 10 - temperature sensor; 11 - relay;

12 - control system dir imami work

CONCLUSIONS

The agitator blades in the sample under consideration are too short.

- this leads to crust formation and low biogas yield. Farmatic reactors are very expensive, and the quality of biogas yield is significantly lower than in the proposed solution. Moreover, Farmatic reactors are not modular structures, and during routine maintenance, the entire fermentation cycle will have to be suspended, that is, the amount of biogas produced will be reduced.

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