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С Ъ Д Ъ Р Ж А Н И Е

The use of combined devices in the apparatus – technological scheme of mini-breweries

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Abstract: *Until recently, time brewing industry developed due to the construction of new large and medium-sized enterprises or reconstruction of existing facilities, aimed not only at their extension, but and to intensify due to the improvement of engineering and technology. However, in recent years, another trend is developing in the Ukrainian brewing industry - the revival of small breweries. Appearance mini-breweries dialectically conditioned and provided, characterize him as a qualitatively new round of technical and technological development in the brewing industry.*

Key words: *mini-brewery, combined machines, mash tun apparatus, filtration apparatus, hydrocyclone apparatus, wort-hydrocyclone unit.*

INTRODUCTION

Recently, the development of the brewing industry due to increased production, diversification and increase their quality.

About 95% of beer produced by breweries big companies that their products virtually took over the entire market. Despite this, today many countries are increasingly growing demand for mini-brewery.

They fit perfectly into such businesses as restaurants, hotels, entertainment, spa and shopping malls, giving visitors the opportunity not only to try this microbrews, but while watching the mystery of cooking. In addition, projects of modern mini-breweries allow normal processing equipment to make a "twist" interior of any institution.

Today, foreign and domestic manufacturers a wide range of mini-breweries. Part of them is a model solution, and some are developed individually taking into account the actual conditions and customer requirements. However, the organization of production and technical equipment, mini-breweries largely remain identical to large enterprises. Unlike a few of them is mainly in the layout of equipment, minor equipment design features, design, automation level and the availability of computerized management.

The main part

According to the purpose of mini-brewery is divided into [1, 2]:

1. Mini-brewery restaurant (bar) type, operating on separate restaurant.
2. Production of mini-breweries capacity from 200-300 dal of beer per day and more than capable of providing unfiltered and filtered beer needs of a single town district scale. Such mini-breweries, usually equipped for beer in KEG-barrel and glass bottles.
3. Mixed type of mini-brewery. Mini-brewery is mounted in a restaurant, but the potential its power far exceeds the needs of the institution. Surplus of beer usually sold outside the institution.

The classic version of the mini-brewery, which consists of cooking offices, plant cooling and fermenting lager-branch is shown in figure 1. [3]

In the mash tun apparatus are in the process of mashing. This operation can be performed either manually or automatically. The prepared mash enters lauter tun, where a process of filtration. Boiling wort with hops in the brewing apparatus is carried out. Hopped wort is served in the whirlpool, where the separation. After this the wort is cooled and fed to the fermentation and storage compartment, where the fermentation process, fermentation, clarification and saturation of carbon dioxide. As needed beer is sent to a filtration, where subsequently held beer is bottled in consumer packaging.

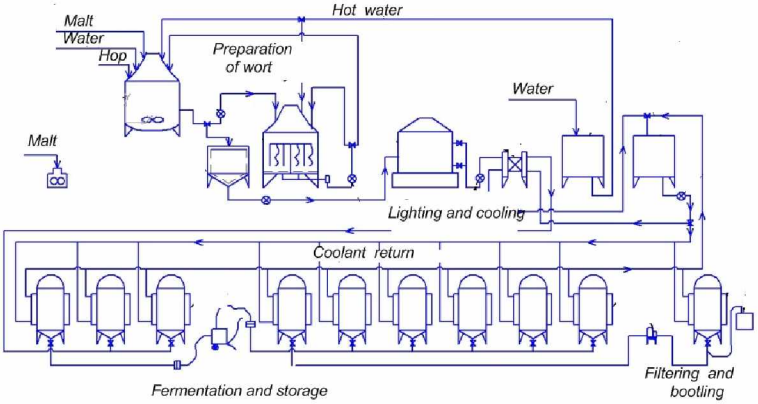

Fig.1. Apparatus-technological scheme of mini-breweries

Among the wide variety of mini-breweries, the proposed import and domestic manufacturers on the Ukrainian market, special attention is paid to integrated mini-brewery. They effectively implemented one of the modern concepts of food instrument making - a combination of several processes and functions in a single piece of equipment.

Thus, the most common combined apparatus for the preparation of wort is a Mash tun apparatus, where the cooking process is carried out as the beer wort and boiling the wort with hops. (fig. 2). It usually consists of a cylindrical tank with spherical or conical bottom equipped with a steam jacket and a mixing device.

Known and construction of the combined company's PSS apparatus [4], which combines the functions of lauter tun, which is located in the upper part and intended to filter the beer mash, and hot water tank, located at the bottom. (fig. 3). Also at the bottom of the device may be located hydrocyclone apparatus.

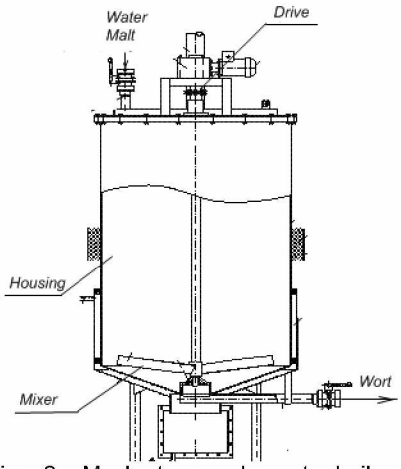

Fig. 2. Mash tun and wort- boiler apparatus

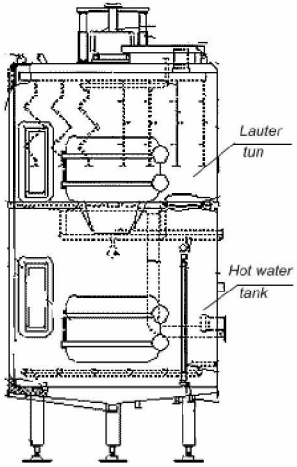

Fig. 3 Combined apparatus

Good technical solution to improve equipment mini-brewery is separation of protein suspensions of hot wort in the same capacity, which held its boiling (wort- boiler and hydrocyclone apparatus).

Such a device is simultaneously used for wort boiling process and its clarification. Thus, the must remain in the machine, which at the end of wort boiling process begins serve as a hydrocyclone apparatus. This is possible only if ihmelivaniya wort used hop pellets or extract.

Fig. 4 shows a diagram of wort-hydrocyclone apparatus with an inner kettle. This unit is also equipped with a tangential inlet pipe for withdrawal of the clarified wort and wort, as well as for erosion ustrystvom protein precipitate formed in the clarification process (fig.5).

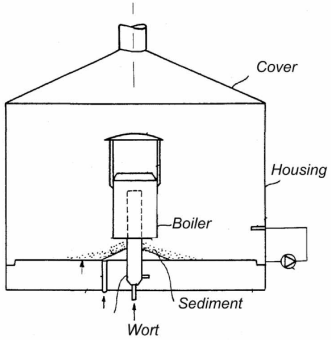

Fig. 4. Wort- boiler and hydrocyclone apparatus with an inner kettle

Naturally, for the separation of suspensions are most effective devices with a flat bottom and without a built-in internal parts. In this case, the appropriate use of devices with remote kettle wort.

It was also suggested to use the brewing-hydrocyclone apparatus with a steam-jacketed [5]. It is a cylindrical tank with conical concave bottom and a conical cover. The unit is equipped with a steam jacket for boiling wort, washing nozzles for cleaning the apparatus and pipes feeding and draining the wort.

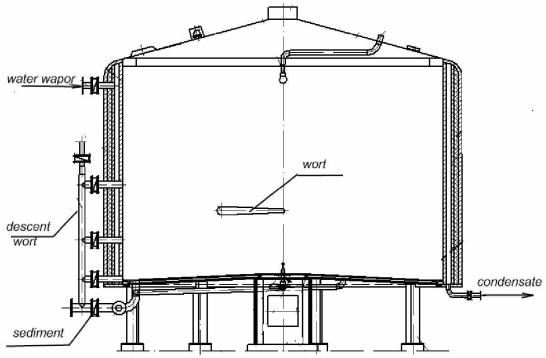

Fig. 5. Wort- boiler and hydrocyclone apparatus

Mash is fed to the device through tangentially established connection that facilitates the process of clarifying and mixing. Heating and boiling of the wort by means of a steam

jacket. The circulation of the wort is carried out using a pump. At the end of the boiling process and clarifying the wort shown pipes installed at different levels.

At the end of the technological process, cleaning tanks and removal of sediment, which was formed, carried out by the lower and upper nozzles, to which is fed through tubes cleaning solution and / or water.

This unit is cheaper at least 1,5-2 times from their foreign counterparts, and is not inferior to imported, analogues, and is not inferior to the imported and in some aspects even exceeds it. Thus, concerning the technological implementation it is more perfect which makes it less vulnerable, more mobile and versatile. It has a big safety and durability margin according to many technical and economic parameters. It is notable for its compact size, low power consumption and a small amount of staff that makes it attractive and very accessible to a wide range of consumers.

CONCLUSION

Thus, the use of combined devices in hardware and technical equipment of the mini-brewery and a mini-brewery makes it possible to greatly simplify the design vehicles and their number, equipment cost and improve the quality of the finished product.

LITERATURE

1. Міні-індустрія: Класифікація засобів виробництва безалкогольних та слабоалкогольних напоїв. С.О. Удодов. Харчова і переробна промисловість, Київ, Україна, 01.2009, с.13-15.
2. Mini- breweries. International analytical magazine "Pyvnoe Delo. 2002г., № 1.
3. Website of "KIY-PIVO", Ukraine. www.kiy-pivo.kiev.ua
4. Prospect firm PSS, Slovakia
5. Patent DE 8631029 «Whirlpool for coarse sludge separation in brewing of beer»
6. Utility patent 56 316, Ukraine " Wort- boiler and hydrocyclone apparatus. / Udodov S., Martsynkevich L., Buhalskyy Y. 10.01.2011, Bulletin number 1, National University of Food Technologies.

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