



SMALL-CAPACITY UNIT FOR FLOUR PRODUCTION AND PANIFICATION

Abstract

Providing the population of small settlements with flour and bread in modern conditions requires energy expenditure on the transportation of grain to the mills, and then to the bakeries and bread itself to the settlements. Therefore, the organization and access into the modern market of the small-capacity units that allow processing of grain at the place of its cultivation into flour and bread at a minimum of energy expenditure and in the best use of anatomical parts of the grain are important.

Flour and bakery industries play a major role in providing Ukraine such socially important products as flour and bread. Ukraine today has adequate potential to procure provisions of food grain for flour and bread. Despite the gradual decline in bread consumption in Ukraine, which is observed in recent years, flour and bread are strategically important products, the production of which brings steady income.

The proposed version of the small-capacity unit in comparison with those released and produced by industry both in Ukraine and abroad, is a simplified version of the powerful means of rolling mills, and that leads to reduction of level in the use of anatomical parts of grain by increasing of the specific energy consumption per unit of the produced products 2-2,5 times more. Thus the most valuable anatomical parts enriched with protein, microelements and vitamins (aleurone layer and germ) do not get in the product of grain processing and are displayed together with brans or partly get in flour of lower quality, which reduces the biological value of flour of the first and higher qualities. In this regard, there was a necessity to create such installation units that could be available for usage in agricultural and large farming enterprises and would allow to get flour and bakery products at the best use of anatomical parts of grain.

Keywords: grain, small-capacity unit, production of flour, panification.

Providing flour and bread for population of small settlements in modern conditions requires energy expenditure on transportation of grain to the mills, and then to the bread-baking plants, and bread to the settlements. Therefore it is essential to create universal small-capacity units that would allow to process grain on the place for its cultivation into flour and bread at the minimum of energy expenditure and at the best use of anatomical parts of grain.

Small-capacity units that were produced and are being produced by industry both in Ukraine and abroad [1, 2] are the simplified variants of the powerful roller mills, and that leads to reduction of level in the use of anatomical parts of grain by increasing of the specific energy consumption per unit of the produced products 2-2,5 times more. Thus the most valuable anatomical parts enriched with protein, microelements and vitamins (aleurone layer and germ) do not get in the product of grain processing and are displayed together with brans or partly get in flour of lower quality [6], which reduces the biological value of flour of the first and higher qualities. In this regard, there was a necessity to create such installation units that could be available for usage in agricultural and large farming enterprises and would allow to get flour and bakery products at the best use of anatomical parts of grain. To achieve this aim an installation unit is offered, the scheme of which is shown in Figure 1.

Grain after rough cleaning at the current is delivered into the hopper 1, from which it enters the aspirating chamber 2, where heavy and light impurities are separated from it, farther grain moves to the grain cleaning machine 3 [7] in which it is cleared up from large, shallow, long and light impurities which are collected in the bunkers 4, 5 and 6. In the aspiration chamber 7 aerodynamically light admixtures are separated from air, farther air is delivered by the

ventilator 8 to the cyclone 9 for separation of dust. The cleared grain is delivered to the hopper 10 of the spray-damping machine 11, where it is washed, moistened, and superfluous moisture is wrung out from it as well. Water is delivered to the machine 11 from the pressure tank or water-pipe (in fig.1 is not shown) through the pipe 12 where it is mixed with grain, than it washes, moisturizes and wrungs out damp grain by the auger 13. Moisturized grain is delivered by the auger 13 into the bunker 14 where it is dampened for a few minutes, due to that the shell is moistened and gets elasticity, and its links with the endosperm are diminished. For the separation of ferromagnetic admixtures grain is delivered to the magnetic column 15, and from it into the roller machine 16, where it is flattened for providing of the minimum fineness of shells and endosperm. The got loose cereals are delivered by the worm 17 by magnets 18 on further processing. If it is flour only to be got, cereals are completely delivered into the machine for separating the shells from the endosperm 19 by the drum sieves, in which the proportion of cereal endosperm is crushed further and separated from the shells on the sieves. Passing through the sieve flour is cleaned of ferromagnetic impurities and is delivered into the supply hopper 20 and the shells into the supply hopper 21. If it is bread products to be got, a portion of cereal (50-70%) is delivered to the rotary machine 22, in which activated yeast and water are delivered from dispensers 23. Leavened dough is kneaded in machine 22 and delivered into unit 24 for fermentation. During the fermentation the endosperm and germ swell, forming a colloidal solution and minerals and vitamins are adsorbed from the shells. After fermentation the leavened dough is delivered into the worm machine 25, where the leavened dough is separated from shell through a conical sieve with holes of 0.4-0.8 mm in diameter. The clean dough is delivered into the machine 26 for kneading of dough, to which

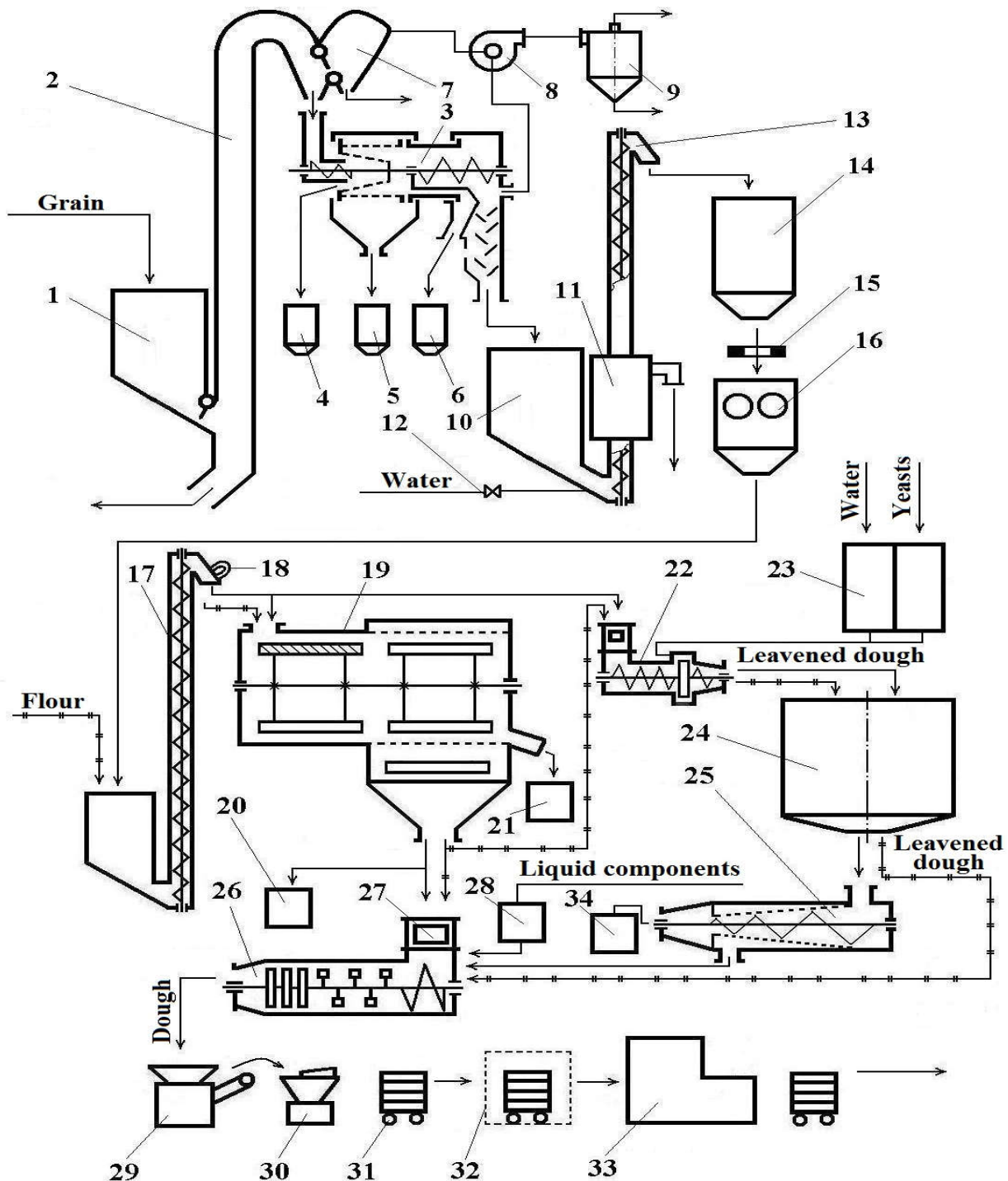


Fig. 1 – The scheme of small-capacity unit for flour production and panification

flour is delivered by the dispenser 27 from the machine 19 and liquid components (salt solution, sugar, fat, etc.) by the dispenser 28. The resulting dough is delivered into the hopper of the dough makeup unit where it comes final fermentation and is divided into shapes, rounded in the rounding machine 30, placed on shelves of the container 31, proofed in the proofer 32 and baked in the oven 33. After baking bread is served on cooling and implementation. Shell, which are derived from the machine 25 is delivered into the hopper 34 for the further use in animal husbandry.

Aggregate unit can be used for bread baking with flour produced in the other roller mills.

For this purpose flour is served into the hopper of the worm 17 and after the magnetic catcher into the machine 19 for redressing, then one part of flour is served into the machine 22 for kneading, and then into the apparatus 24 for fermenting dough. After fermentation leavened dough is delivered into the machine 26 [9], where the second part of flour is delivered by the dispenser 27 and liquid components by dispenser 28, the dough is kneaded.

Then the dough is divided into pieces in the separating machine 29, they are rounded in the machine 30, placed in the container 31, proofed in the proofer 32 and baked in the oven 33. The resulting bread is

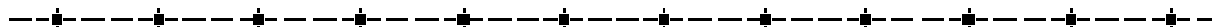


implemented. Sieves with holes of 1.8-2.4 mm in size are installed into the machine 19 for controlling of flour. The apparatus (unit) can also get high quality whole-wheat flour by replacing the smooth rollers on grooved ones and by setting the roll transmission with gearing ratio of 1.5 or 2.5 to the roller machine 16.

Thus offered method of obtaining bread of grain allows to create an economic, universal, simple small-capacity device for producing of flour and bread, suitable for the use in the collective agricultural enterprises and farms as well.

REFERENCES

1. Stankoprom (The Machine Tool Industry). Catalog of grain processing equipment. Kharkiv. CJS Company "Institution of Ukorgstankoprom".
2. Aggregate mill P6-ABM-15. Passport. Mogilev-Podolsky Machine-building Plant.
3. Mukomolnye Komplekсы (Flour-milling complexes). Brochure of Company SKIOLD Saebу A/S, Denmark, 21.08.2004.
4. IBIS. Vкус Polskogo Hleba (The taste of Polish bread). Brochure of Company IBIS dgoszcz, Poland.
5. Khromeenkov V.M. Technological equipment of bakeries and macaroni factories. - St. Petersburg.: GИОРД, 2003. - 496 p-s.
6. Kazakov E.D., Kretovich V.L. Biochemistry of grain and products of its processing. - M.: Agropromizdat, 1989. - 368 p-s.
7. Grosul L.I., Petko V.F., Chanovsky V.M. Cleaning unit. / Patent 12520 Class A. MKI B07 B13/00. Inventions №1 28.02.97
8. Pekarnya Modulnogo tipa (Bakery of Modular Type) // Bakery - 2002, №9. 38-39 pp.
9. Dough-mixing machine continuous action / Kozlov G.F., Mendelev V.I., Pshenyshnyuk T.F. / Brazhnyk A.M., (USSR) 1018610. Invention №19, 1983.
10. Patent for an Invention №82070 "A method for producing bread of grain" (2006) B02B 3/14 (2006.01) A21B 1/00 Application №2005 01281 Date of application 15.12.2006 Bulletin №12, Date of issue 11.03.2008 №5 Petko Yevheniy Volodymyrovych.



ГОНЧАРУК А.А., канд. техн. наук, доцент, ПЕТЬКО Є.В.

Одеська національна академія харчових технологій

МАЛОГАБАРИТНА УСТАНОВКА ДЛЯ ВИРОБНИЦТВА БОРОШНА І ХЛІБА

Анотація

Забезпечення населення малих населених пунктів борошном та хлібом в сучасних умовах потребує великих затрат енергії на перевозку зерна до млинів, а потім до хлібозаводів, а хліба до населених пунктів. Тому важливим є створення універсальних малогабаритних установок, які дозволяли б переробляти зерно на місці його вирощування в борошно і хліб при мінімальних затратах енергії і при найкращому використанні анатомічних частин зерна.

Борошно-хлібопекарська промисловість відіграє важливу роль у наданні Україні таких соціально важливих продуктів, як борошно та хліб. Україна сьогодні має достатній потенціал для вирощування харчових зернових для борошна та хліба. Незважаючи на поступове зниження споживання хліба в Україні, що спостерігається в останні роки, борошно та хліб є стратегічно важливими продуктами, виробництво яких забезпечує стабільний дохід.

Запропонована малогабаритна установка в порівнянні з тими, які випускались і випускаються промисловістю як в Україні так і за її межами являються спрощеними варіантами потужних вальцових млинів, а це приводить до зниження рівня використання анатомічних частин зерна при збільшенні питомих затрат енергії на однією випущеної продукції в 2-2,5 рази. При цьому найбільш цінні анатомічні частини збагачені білками, мікроелементами та вітамінами (алейроновий шар та зародок) не попадають в продукт переробки зерна і виводяться разом з висівками або частково попадають в борошно нижчого татунку, що знижує біологічну цінність борошна першого та вищого татунків. В зв'язку з цим виникла необхідність створити такі установки, які могли б бути доступні для використання в сільськогосподарських та крупних фермерських підприємствах і дозволяли б одержувати борошно і хлібобулочні вироби при найкращому використанні анатомічних частин зерна.

Ключові слова: зерно, малогабаритна установка, виробництво борошна, виробництво хліба.

ЛІТЕРАТУРА

1. Станкопром. Каталог зернопереробного обладнання. Харків. ЗАТ «Інститут Укрорганкопром».
2. Агрегатний млин Р6-АВМ-15. Паспорт. Могильов-Подільський машинобудівний завод.
3. Борошномельні комплекси. Проспект фірми SKIOLD Saebу A / S, Denmark, 21.08.2004.
4. IBIS. Смак польського хліба. Проспект фірми IBIS dgoszcz, Poland.
5. Хромеев В.М. Технологічне обладнання хлібозаводів і макаронних фабрик. - СПб.: ГИОРД, 2003. - 496 с.
6. Казаков Е.Д., Кретович В.Л. Біохімія зерна і продуктів його переробки-ки. - М.: Агропромиздат, 1989. - 368 с.
7. Гросул Л.І., Петко В.Ф., Чановського В.М. Зерноочисну агрегат. / Патент 12520 А. Клас МКІ В07 В13 / 00.Бюл. винаходів №1 28.02.97 р.
8. Пекарня модульного типу // ХЛІБОПРОДУКТИ - 2002 №9. с.38-39.
9. Тестомесильная машина безперервної дії / Козлов Г.Ф., Менделєєв В.І., Пшенишнюк Т.Ф. / Бражнік А.М., а.с. (СРСР) 1018610. Бюл. Винаходів №19, 1983.
10. Патент на винахід №82070 "Метод виготовлення хліба зерна" (2006) В02В 3/14 (2006.01) А21В 1/00 Заява №2005 01281 Дата подання заявки 15.12.2006 Вісник № 12, Дата видачі 11.03.2008 № 5 Петко Євгеній Володимирович.

Надійшла 23.08.2017. До друку 28.08.2017

Адреса для переписки: вул. Канатна, 112, м. Одеса, 65039

