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# *Processing equipments: Mechanization and equipment used in manufacture of indigenous dairy products*

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# Outline

- Butter making machines
- Introduction
- Batch butter churns
- Continuous Churns



## Introduction

### Batch butter churns

- Rotating churns

The rotating butter churn was introduced in the nineteenth century and gradually from farm butter making it was adopted for the factory butter making by the butter industry. The rotating churns consisted mainly of a barrel rotated on an axis with shelves of various kinds to increase the agitation effect. The first combined churn and butter worker was introduced in USA in 1890. The combined churn and butter worker was of short barrel type.



## Batch method using rotating churns

The use of batch churn for butter manufacture is on decreasing trend because of increase in popularity of improved designs of continuous butter making machines. In India, however, the butter produced by organized dairies is made by batch churns, except a few leading dairies.

$$\text{i.e. } m\omega^2 R < mg$$

$$(2\pi n)^2 R < g$$

$$\text{Or } n < [g/R]^{1/2} \cdot 1/2\pi \approx 1/(2\sqrt{R})$$

The energy consumption is about 7 - 11 kWh per 1000 kg of butter of which about 90% is used in churning and 10% in working. The lower values are for the cream with a higher fat content.



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- 1) Loading the cream
- 2) Churning
- 3) Buttermilk draining
- 4) Washing
- 5) Working
- 6) Unloading and Packing
- 7) Care of churns



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## Continuous churns

Continuous butter making was first introduced in 1889 following successful development of centrifugal separation of cream from milk by a continuous process. The machine developed was first exhibited in England in 1889. The machine was known as butter extractor. The separated cream was beaten with great violence and thus converted into butter granules, which was discharged along with the buttermilk.



## **Continuous butter making**

1. Machines operating on Fritz process or floatation churning,
2. Machines operating on concentration of normal cream followed by phase inversion, cooling and mechanical treatment
3. Machines operating on concentration of normal cream de-emulsification and reemulsification into butter are available with commercial names of Gold'n Flow Process (USA), New Way Process (Australia) and Creamery Package Process (USA).

## **The Fritz Process**

- 1) Preparation of cream
- 2) Churning the cream
- 3) Butter milk separation and draining
- 4) Washing the granules
- 5) Working and texturizing



## Concentration, De-emulsification and Re-emulsification Process

1. Destabilization
2. Concentration
3. Pasteurization
4. Standardization
5. De-emulsification and Texturization

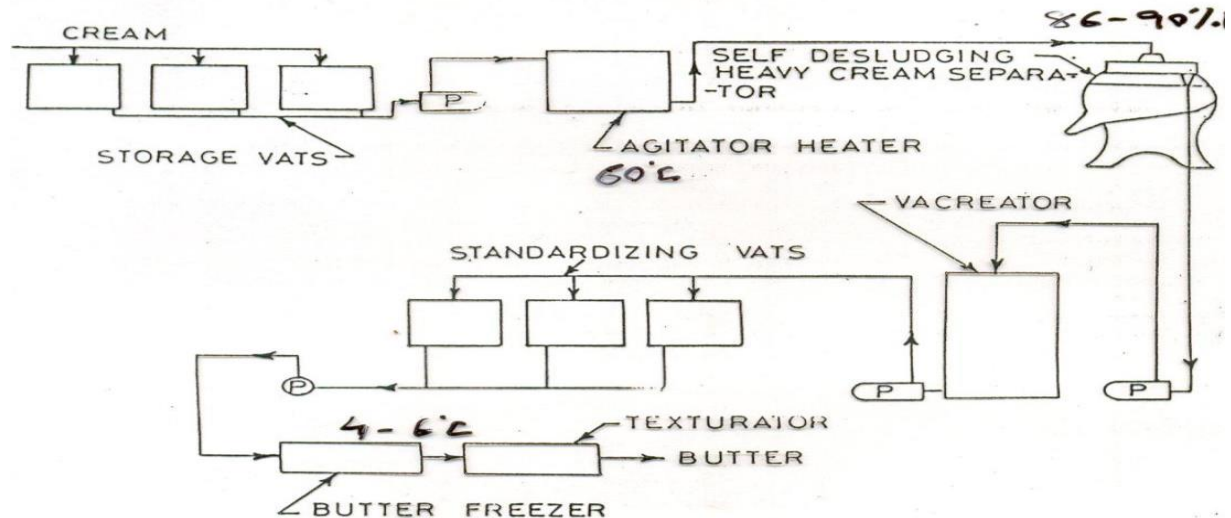


Fig. Gold'n Flow Process – Continuous Butter churns





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Thank you