

## A Fryer for Battered and Breaded Fishery Products

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A fryer for frying battered and breaded seafood products was developed. It consists of a stainless steel vessel designed to minimise the quantity of oil and obtain maximum heating efficiency and is provided with an internal heating system with temperature control. The equipment can be used to deep fry about 200 cutlets and similar products per hour. The fryer could be used advantageously by small scale caterers and fast food restaurant operators.

**Key words:** Fryer, battered and breaded products, temperature control

Present market trends reflect a rapidly growing demand for ready to serve and ready to cook convenience fishery products. The sophisticated consumer demands new types of value added, hygienically prepared nutritious products. The growth of the market is particularly apparent in prepared meals and in general has been brought about by the demands of a more conscious consumer who requires a wide range of food to be available in a form that requires only minimal preparation. Technology for production of a large number of value added marine products based on shrimp, lobster, squid, fish, bivalves and minced meat from low priced fish is available (Hunter, 1991; Gopakumar, 1997; Rowan, 1997).

Battered and breaded seafood is 'convenience' food with high degree of consumer appeal. Many of them are consumed after frying in oil. However, the fryers available in the market are of very high capacities for use by large-scale operators. Therefore attempts were made to develop a fryer suitable for small-scale operators and fast food restaurants for frying battered and breaded fish products.

### Materials and methods

The fryer consists of a specially shaped stainless steel (SS) vessel of three litre capacity designed to minimise the volume of oil for frying. An internal electrical heating system of 1.5 kW is provided in the cylindrical portion of the fryer that is kept immersed in the oil. The heating element is connected through a thermostat to regulate the temperature of oil to the required level. A SS drain pipe which can be closed with an end plug is provided at the bottom to drain out the oil after frying and to clean the vessel. A removable stainless steel filter is provided to collect the sediments from the oil after frying. The vessel is fitted with SS sloping trays at both ends to allow the excess oil to drain from the fried material and flow back into the heating vessel to reduce its wastage. The frying panel is fixed at a convenient height of 700 mm using frame supports for comfortable

operation by a standing operator. The fryer body is completely covered with SS sheet for attractive appearance Fig. 1.

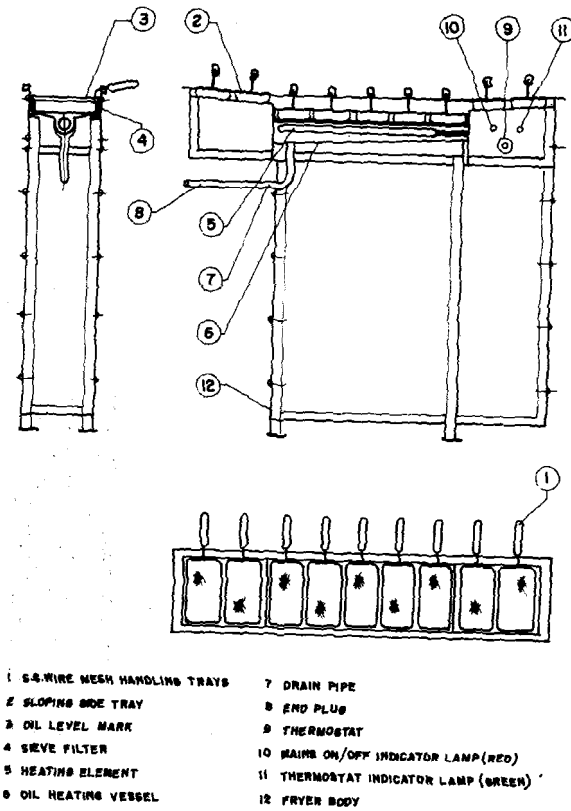


Fig. 1. Design of fryer

For frying, the vessel is filled with cooking oil upto the oil level mark. Oil should be maintained at this level during operation. Recommended temperature for frying of battered products is 175-185°C.

For deep frying, the product kept in wire mesh handling trays is immersed in hot oil for the required time by moving from one end of the fryer to the other ensuring minimal damage. After frying, the excess oil is allowed to drain from the fried products by keeping the trays at the sloping end of the fryer after which the fried products are taken out. For flash frying, the product is kept in a special tray, occupying the area of the heating vessel, and fried at 175°-185°C for 20 to 30 seconds depending upon the type of product. For changing the oil and cleaning, the end plug can be opened and the oil allowed to drain through a filter into a clean container.

**Results and Discussion**

Details of the fryer are shown in Table 1. Even though it is provided with a heating capacity of 1.5 kW, the average power consumption during operation is only one kW/h. The output of deep fried battered and breaded products is 8 kg/h, whereas it is 40 kg/h when the product is only flash fried.

**Table 1.** Details of the fryer

Length	860 mm
Width	440 mm
Height	700 mm
Nominal output	
Deep frying	8 kg/h
Flash frying	40 kg/h
Heater capacity	1.5 kW
Power consumption (average)	1 kW per h

Frying in oil yields a product unique in appearance and taste making it attractive to the consumer. A golden brown colour is associated with breaded products. Since the fryer is designed to maintain desired operating temperatures at constant levels this can be achieved easily by adjusting the frying temperature. Frying of breaded products normally leads to breaking away of small crumbs and batter which will get charred and affect the quality of the oil if allowed to remain in the oil. This is minimised by providing a sloping bottom to the vessel to allow for easy sedimentation for collection of the particles detached from the product. Further, turbulence of oil which can increase circulation of the particles detached from the product in the oil is minimised by providing direct internal heating. The draining board provided allows easy collection and reuse of drained oil. The oil absorbed by the fried food is only 4-15%. Thus the system allows for economy in the use of oil by ensuring minimum loss.

The equipment requires minimum floor space and can be easily installed. It allows for easy access to all parts for easy cleaning and maintenance.

**References**

- Hunter, G. (1991) *Infofish International*, 3, 58  
 Gopakumar, K. (1997) *Fisheries World* 2, 22  
 Rowan, C. (1997) *Food Manufacture*, 9, 45