

**DEVICE FOR CONTINUOUS FRYING AND DISCHARGING OF DEEP FAT
FRIED EDIBLE PRODUCTS**

5

FIELD OF THE INVENTION

This invention relates to a device useful for continuous Frying and discharging of deep fat fried urad vada and other similar kind of products.

10

BACKGROUND OF THE INVENTION

The device of the present invention is particularly useful as an urad vada Fryer and discharge the deep fat fried urad vada in a definite shape continuously and consistently from the said system.

- 15 Urad vada is a popular snack food, consumed in India and to some extent abroad. Vada is prepared from black gram cotyledons. The black gram cotyledons soaked in water at room temperature for about 4 to 5 hrs and ground to a fine viscous batter with addition of salt to taste. The prepared batter is formed in to donut shape and dispensed continuously by the other unit in to the said fryer and fried in to get golden colored
- 20 crisp product and served immediately for consumption. In this context frying of urad vada in a said desired quality, in a hygienic manner and at the lowest possible cost is a very critical operation to derive an acceptable end product.

- In the present and existing practices, formed donut shaped vada is manually fried in a in
- 25 a conventional batch type pan fryer and fried vada is removed with the help of a perforated ladle is also a manual operation.

- As a food adjunct along with the other staple food and idli-sambar, vada has been consumed in a large quantity. But the production of urad vada in a large scale was felt
- 30 difficult by many Catering Institutions, Fast Food outlets & Restaurants due to existing manual frying batch type operations. In order to facilitate and to eliminate the drudgery of the chef, the present invention envisaged at mechanisation of manual frying and discharging of fried vada continuously very accurately.

Large-scale production of fried urad vada with manual operations is facing a major constraint in frying and discharging that to in a desired quality level, at right time and in a hygienic manner. This poses many problems like drudgery to the chef, unhygienic due to manual handling; inconsistent, improper frying, time consuming and the shape of the final product may not be as desired.

There is one such automatic machine commercially available on the market for continuous frying operations for wheat based donut, ie, Belshaw Fryer, Belshaw Bros., Inc. 1750 22nd Avenue South. Saettie, WA., 98144-4590.USA. These machines are basically operated and controlled by an AC motor and electronic regulating mechanism. And these are essentially consists of a endless frying conveyer, and oil trough with electrical immersion heater and gas fired heating arrangements, and mechanism for adjusting the speed of the conveyer etc.

Though the above continuous frying machines are available in the market, some of the drawbacks encountered are as follows:

1. As there is considerable change in rheological properties of wheat dough and urad dhal batter, these machines are used for frying and & discharging of fried uradvada is difficult. Moisture level as high as 70% compared to the wheat dough
2. As these machines are working mainly on a conveyor mechanism, there is a possibility of getting damaged or improper shaped fried vada as there is changes in the rheological properties compared with the wheat dough.
3. Consumes more electrical energy due to more metal contact parts with the frying oil due to heat dissipation.
4. Cost of the unit is very high.
5. Cleaning machines is comparatively difficult
6. Maintenance is high due to the complicated due
7. Occupies more space.

The main objective of the present disclosure is to provide a device useful for continuous frying and discharging of fried urad-vada and other similar kind of end products; which obviate the above noted drawbacks.

- 5 Another objective of the present disclosure is to eliminate the complicated design such as mainly conveyor, more moving metal parts in the frying oil and to provide a simple device for frying and discharging of fried urad vada.

10 Yet another objective of the present disclosure is to provide an economically cheaper device for frying and discharging of fried urad vada and other similar kind of end products.

Yet another objective of the said disclosure is to provide a device having simplest mechanism.

- 15 Still another objective is to provide continuous and consistent operation of the unit for on line production.

20 Still another objective is to provide noiseless continuous operating mechanisms and consistent operation of the unit for production of uradvada.

Yet another objective of the said disclosure is to provide a maintenance free device with simplest mechanism.

- 25 In a first aspect, there is provided a device useful for continuous frying and discharging of urad vada and other similar kind of food products, characterized in that the said device comprises: an oil trough adapted to hold frying oil; a leakage-proof partitioning means disposed in the said oil trough for separating the oil trough into four equal open-end partitions forming an endless channel adapted to canalize an endless stream of
30 frying oil; rotating paddle wheels mounted on horizontal shafts which in turn are mounted and held freely with the help of suitable ball-bearings adapted to provide smooth rotary motion of the said paddle wheels providing means for creation of endless

stream of frying oil in the said endless channel; a chain conveyor fitted at the out-let end of the oil trough; oil filtering means adapted for replenishing fresh frying oil by filtering out charred and residual particles therefrom; an LPG burner assembly adapted to regulate flow of LPG; four rigid legs with adjustable jack screws adapted to support
5 the whole fryer assembly; and a discharge chute.

In the drawing accompanying these specifications depicts an embodiment of the device of the present invention.

10 Accordingly, the present invention provides a device useful for continuous frying and discharging of fried urad vada and similar kind of fried products, which comprises an oblong Mild steel oil trough with supporting legs (1) the whole trough is divided in to four equal channels forming an endless stream (2) and which are made as leak proof channels. Eight small rotating Paddles wheels are mounted freely suiting to each
15 channel dimensions in order to create an endless stream of oil in the trough(3) Paddle wheels are mounted firmly on a rotating shaft(4), which are in turn mounted on the wall of the trough with suitable bearings and attachments in order give free and noiseless

motion. Fried urad -vadas will be removed by the help of a specially designed chain conveyor (5) fitted at the out let end of the trough. A discharge chute (6) with suitable inclination is also been provided to remove urad vada continuously. The fryer also been provided with a oil filter mechanism (7) with provision for the replenishment of the fresh oil. There is a long LPG burner (8) for heating has been provided with valves, flow meters and controls. The whole assembly will be positioned on a rigid four legs with adjustable jack screws (9) to give support to the Fryer assembly.

An embodiment of the present invention provides a urad vada frying and discharging device for production of deep fat fried urad vada in a donut form. which comprises of an oblong mild steel oil trough (1) for holding food grade frying oil for urad vada, the whole trough is made in to four equal channels to hold frying oil and to create an endless stream (2) these divisions of channels are made out of stainless steel with leak proof welding.

Another embodiment of the present invention provides, four pairs of small rotating paddles wheels (3) in order to create endless stream of frying oil and suitably places within each channels. Mounted conveniently in to the channels,

Yet another embodiment of the present invention provides, paddles wheels mounted on horizontal stainless steel shafts (4), which are in turn mounted and are held freely with the help of suitable ball bearings in order to provide smooth rotating motion.

Still another embodiment of the present invention, provides a specially designed chain conveyor (5) fitted at the out let end of the trough. A discharge chute (6) with suitable inclination is also been provided, by which fried urad-vadas will be removed consistently and continuously.

Still another embodiment of the present invention, provides an oil filter mechanism (7) with a provision for replenishment of fresh frying oil, by which all the residuals will be filtered and removed

Still another embodiment of the present invention, provides a long LPG heating burner (8) with suitable controls for regulating the LPG flow and the whole assembly is mounted on a rigid framework.

5 The operation of the device of the present invention is as follows:

The forming unit for dispensing of urad vada batter in to the fryer is suitably mounted with Urad vada batter on the fryer and located the dispensing place for batter to be deposited in a definite shape. . The oil level in the fryer is adjusted with spirit level and
10 LPG burner kept on. The required flame and quantity of the LPG flow is also been controlled by the help of controls. The Integrated motor is switched on for both the paddle wheels driving and urad vada discharging conveyor chain. As soon as the required frying temperature of the oil is reached, the urad-vada forming unit is switched for batter to be deposited in to the moving hot oil in a definite shape. Shaped vadas
15 will be moving in the channels for nearly about 2 ½ minute of residence time and discharged through a out let chute provided on the fryer. Operations are repeated continuously for a predetermined period of time and charred and residual particle will also be removed with the help of a filter provided on the machine. After the removal of unwanted materials, fresh oil will be replenished and kept the machine for the next
20 operation.

The following drawing and examples are given by way of illustration of the invention and not to be construed for limiting the scope of the present invention.

25 **FIGURE-1**

Figure I in the drawing sheet illustrates top view of horizontal cross section of a device useful for continuous frying and discharging of urad vada and other similar kind of food products. Numeral 1 indicates an oblong Mild steel oil trough with supporting legs, numeral 2 indicates four equal open-end partitions forming an endless channel,
30 numeral 3 indicates paddle wheels providing means for creation of endless stream of frying oil in the said endless channel, numeral 4 indicates rotating shaft, numeral 5 indicates chain conveyor, numeral 6 indicates a discharge chute and numeral 7 indicates oil filter mechanism.

FIGURE 2

Figure 2 in the drawing sheet illustrates side view of vertical cross section of a device useful for continuous frying and discharging of urad vada and other similar kind of food products. Numeral 5 indicates chain conveyor, numeral 6 indicates a discharge chute and numeral 7 indicates oil filter mechanism, numeral 8 indicates LPG burner and numeral 9 indicates a rigid leg with an adjustable jack screw.

Example –1

The present device is an actual prototype working model for frying traditional urad vada and like products, comprises mainly an oblong metallic oil trough, an endless stream of oil is made by dividing the trough into four channel divisions of nearly 100mm width and 1350mm long, rotating paddle wheels (8 Nos.) with horizontal shafts are mounted suitably on bearings. And a chain conveyor for removing fried vada from the trough suitably mounted at the outlet end of the fryer, and an LPG burner with controls has also been provided. The whole assembly is accurately mounted on an adjustable screw jack arrangements at its four corners.

Example –2

Experimental studies were conducted on the unit to check the performance. 5 kg of urad vada batter was prepared using locally procured raw materials, prepared the batter to the required consistency of the urad vada batter. Switched on the motor of the fryer as well as the LPG burner. After making all preliminary settings such as the speed of the paddle wheel (10 rpm.) and vada removing conveyor and the frying temperature (220 C).

Example-3

Using an automatic urad vada forming unit, the Product from the forming unit was made to directly fall on to the said deep fat fryer and donut shaped product dimensions were taken measured before frying inner diameter 20-25, outer diameter 60 mm and the thickness around 12 mm. The vada is fried in the fryer for the set residence time of (2.5 min.) and fried vada is removed from the fryer with the help of the conveyor.

The experimental estimated capacity of fryer is approximately 600 vadas/hr and the product was tested for sensory quality and found the device was excellent ly giving good product and able to achieve 600 pieces/hr.

- 5 From the above experimental studies it is understood that, the said device is useful for frying the traditional urad vada of uniform shape, size and the best quality fried vada and the like products. And also it can eliminate the drudgery of the chef while replacing the present manual practicing of frying urad vada in a large capacity.

10 **The main advantages of the device of the present invention are:**

1. The unit is suitable for continuous operation.
2. The frying operation pertaining to the frying time depends upon the raw material characteristics and capacity can be suitably varied by adjusting the residence time
15 and temperature of the oil by means of controls.
3. The unit is simple to operate for frying and discharging vada continuously in a predetermined shape and size.
4. The unit is economically cheaper and hygienic.
5. Less charred deposits and residuals in the fryer due to less movable parts in the
20 frying trough.
6. The unit can also be used for other products similar to urad vada.
7. Easy to dismantling, and easy to clean.
8. Occupies lesser space and can be suitably mounted with the available minimum
25 space, as there are no extended parts from the device.

We claim:

- 1) A device useful for continuous frying and discharging of urad vada and other similar kind of food products, characterized in that the said device comprises:

5 an oil trough adapted to hold frying oil; a leakage-proof partitioning means disposed in the said oil trough for separating the oil trough into four equal open-end partitions forming an endless channel adapted to canalize an endless stream of frying oil; rotating paddle wheels mounted on horizontal shafts which in turn
10 are mounted and held freely with the help of suitable ball-bearings adapted to provide smooth rotary motion of the said paddle wheels providing means for creation of endless stream of frying oil in the said endless channel; a chain conveyor fitted at the out-let end of the oil trough; oil filtering means adapted for replenishing fresh frying oil by filtering out charred and residual particles
15 therefrom; an LPG burner assembly adapted to regulate flow of LPG; four rigid legs with adjustable jack screws adapted to support the whole fryer assembly; and a discharge chute.

- 2) A device as claimed in claim 1, wherein the oil trough used is an oblong shaped
20 and made of mild steel forming the main part of the fryer where frying oil is filled and all the accessories are mounted.

- 3) A device as claimed in claims 1 and 2, wherein paddle wheels are preferably eight in number and are arranged in four pairs, each pair is firmly mounted on an
25 horizontal-rotating steel shaft.

- 4) A device as claimed in claims 1 -3, wherein the shaft is mounted on the wall of the trough with suitable ball bearings and attachments such that two wheels in the pair occupy alternate channels.

- 5) A device as claimed in claims 1 -4, wherein the shaft is mounted on the wall of the trough with suitable ball bearings and attachments to provide free and
30 noiseless motion of paddle wheels.

6) A device as claimed in claims 1 –5, wherein fried urad -vadas are discharged by a specially designed chain conveyor.

5 7) A device as claimed in claims 1 –6, wherein fried urad -vadas are discharged through outlet chute fitted at the out let end of the trough .

8) A device as claimed in claims 1 –7, wherein long LPG burner used for heating has been provided with plurality of valves, flow meters and controls.