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(54) **Title:** FRIED SNACK, A METHOD OF PREPARING THE FRIED SNACK AND A SYSTEM FOR PREPARATION THEREOF

(57) **Abstract:** The present disclosure provides a dehydrated fried snack of pulse characterized in that the dehydrated fried snack having moisture content of less than 5% w/w, water activity value of less than 0.5 and shelf life up to 6 months. Further, the disclosure provides a method of preparing dehydrated fried snack. In addition, the present disclosure provides a system for preparing a fried snack.

FRIED SNACK, A METHOD OF PREPARING THE FRIED SNACK AND A  
SYSTEM FOR PREPARTION THERROF.

FIELD OF THE INVENTION

[001] The present disclosure relates to a dehydrated fried snack of pulses and lentil. The present disclosure also relates to a method for preparing the dehydrated fried snacks. In addition, the disclosure relates to a system for preparing the dehydrated fried snack. This disclosure also relates to a system for large scale manufacturing of dehydrated fried snack. The system provides a fried snack in a definite shape continuously and consistently from the said method and system. The dehydrated fried snack is capable of being stored at normal temperature upto 6 months.

BACKGROUND

[002] Vada, also known as vadai or wada or vade(in Sri Lanka) or vadai or bara is a savoury fritter-type snack from South India. It is a popular fried snack consumed in India and to some extent abroadand prepared from combination of various lentils by grinding the soaked lentils to obtain dough and frying the small disc shaped or donut shaped dough in oil. Sometimes, other flour or finely cut vegetables etc, are added to the dough and are fried in oil to obtain fried snack. It is also possible to mix boiled smashed potato paste with the dough to increase the taste. While vadas can be prepared of any shape or size, generally they are either doughnut or disc-shaped and are between 5 and 8 cm across.

[003] They are usually a high calorie morning food, typically about 500 Kcal / 100 g.

[004] The general way of preparing vada is to make a paste or dough with gram flour or mashed or diced potatoes and/or dal lentils. The paste or dough is subsequently seasoned by mixing with black mustard seeds, onion, curry leaves, cut vegetables which are sometimes previously sautéed, i.e., frying quickly in hot oil, and salt, chilies and/or black pepper grains. Often ginger and baking soda are added for seasoning. The individual vada

are then shaped and deep-fried. Certain types of vada are covered in a gram flour batter before frying.

[005] The main varieties of vada are as follows:

[006] (1) Medhuvadai [or ulundhuvadai in Tamil, Uddina vade in Kannada, Uzhunuvada in Malayalam] which is made with Urad dal (black gram) flour. This vada is shaped like a doughnut, with a hole in the middle. It is the most common vada type throughout North and South India.

[007] (2) 'Masala vadai or paruppuvadai (Tamil), Masala Vade in Kannada : 'Masala Vada' in Telugu; Malayalam: പരിപ്പുവട) whose main ingredient is pigeon pea or toor dal or arhar dal and Chana dal. The masala vadais made with the whole lentils and is shaped roughly like a flying saucer.

[008] In addition, other types of vada such as (3) Ravavadai, i.e. vadai made of semolina; (4) Bonda, or Batatavadai, made with potatoes, garlic and spices coated with lentil paste and fried; this form is used in vadapav; (5) Sabudanavadai is another variety of vadai popular in Maharashtra, made from Pearl Sago; (6) Thavalavadai, a vadai made with different types of lentils; (7) KeeraiVadai (Spinach Vadai) is made with spinach-type leaf vegetables along with lentils.

[009] Another vada type, i.e., uradvada 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 donut shape and dispensed continuously by the other unit to a fryer and is fried to get golden colored crisp product and served immediately for consumption. In the present and existing practices, uradvada is formed donut shape is manually fried in conventional batch type pan fryer and is removed with the help of a perforated ladle, which is also a manual operation.

[0010] Uradvadais also as a food adjunct along with the other staple food such as idli-sambar and the above has been consumed in a large quantity. However, the production of

uradvada in a large scale was felt difficult for many catering institutions, fast food outlets, restaurants due to existing manual frying batch type operations. Large-scale production of fried vada with manual operations is facing a major constraint in frying and discharging, which in a desired quality level, at right time and in a hygienic manner. This poses many problems like labor 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.

[0011] There are conventional frying machines available in the market and each one has some drawbacks. The rheological properties of dal batter are critical as the dough has moisture level up to 70%. These devices use conveyor mechanism and due to rheological properties of the batter or dough, uniform or consistent shape of fried vada is not obtained. The frying time of pre-shaped dough batter depends on size, shape and thickness, the final fried product may have inconsistent features like taste, moisture content, shelf life etc. In addition, cleaning of these devices will be laborious.

[0012] In order to facilitate and to eliminate the hard work, the present disclosure envisages mechanization of manual frying and discharging of fried vada continuously very accurately.

[0013] The fried vada usually has moisture content of more than 35% and it has to be consumed immediately. It is not possible to store the fried vada beyond one or two days under refrigerated condition due to this moisture content. Further, it is difficult to remove moisture from vada which is primarily responsible for lower shelf life.

[0014] There are pre-cooked foods available and they can be used after rehydrating. However, there is no reported literature or information that such fried vada can be stored for 6 months without degradation of its quality and taste.

[0015] In the present disclosure, a method is described for process steps in large scale vada production with the vada so produced having a shelf life up to 6-months. The process involves preparation of fried snack and subjecting the fried snack to dehydration

to obtain dehydrated snack namely dehydrated vada which is capable of being stored for about six months without degradation. There is no dehydrated fried snack i.e. dehydrated vada having a shelf life upto 6months available in the market.

5 [0016] The present dehydrated fried snack i.e. vada can be taken as such or it can be served as sambar-vada, rasam-vada, dhahi-vada etc depending upon the taste requirements of the consumer.

[0017] The main object of the present disclosure is to provide a process method to produce dehydrated fried snack which is capable of stored up to 6 months without any microbial growth.

10 [0018] Another aspect of the present disclosure is to provide a system for preparing dehydrated fried snack.

[0019] Another objective of the present disclosure is to eliminate the complicated design such as conveyor, more moving metal parts in the frying oil and to provide a simple system for frying and discharging of fried vada such as uradvada and other similar  
15 products.

[0020] Yet another objective of the present disclosure is to provide an economically cheaper device for frying and discharging of fried vada such as uradvada and other similar kind of end-products.

#### SUMMARY OF THE INVENTION

20 [0021] The present disclosure provides a dehydrated fried snack of one or more pulses characterized in that the dehydrated fried snack so produced having moisture content of less than 5% w/w, water activity value of less than 0.5 and shelf life upto 6 months. Further, the disclosure provides a method of preparing dehydrated fried snack.

[0022] In addition, the present disclosure provides a system for preparing a fried snack  
25 wherein the system has a die; a hopper which is mounted above the die, and the hopper is adapted to receive to batter and supply it to the die; at least two rollers mounted on the die

to rotate about its respective longitudinal axis in order to feed homogenized batter and the die having a plurality of holes, and wherein the homogenized batter enters the plurality of holes to form a pre-defined shaped batter for preparing a fried snack.

#### DESCRIPTION OF ACCOMPANYING DRAWINGS:

5 [0023] Figure 1 represents side view of arrangement of system for preparing fried snack;

[0024] Figure 2 represents top view of system for preparing fried snack

[0025] Figure 3 represents a flow chart of preparing dehydrated fried snack

#### DETAILED DESCRIPTION OF THE INVENTION

10 [0026] Those skilled in the art will be aware that the present disclosure is subject to variations and modifications other than those specifically described. It is to be understood that the present disclosure includes all such variations and modifications. The disclosure also includes all such steps, features, materials referred to or indicated in this specification, individually or collectively, and any and all combinations of any or more of such steps or features.

15 [0027] The articles “a,” “an” and “the” are used to refer to one or to more than one (i.e., to at least one) of the grammatical object of the article.

[0028] The terms “comprise” and “comprising” are used in the inclusive, open sense, meaning that additional elements may be included. Throughout this specification, unless the context requires otherwise the word “comprise”, and variations, such as “comprises”  
20 and “comprising”, will be understood to imply the inclusion of a stated element or step or group of element or steps but not the exclusion of any other element or step or group of element or steps.

[0029] The term “including” is used to mean “including but not limited to.” “Including” and “including but not limited to” are used interchangeably.

25 [0030] Vada, Vadai, Vade are the same defines fried snack as per the present disclosure.

**[0031]** Dehydrated

**[0032]** "Dehydrating" herein means the process of removing the naturally contained water from food, such that the natural water content is reduced, whereas "rehydration" is meant to be understood as supplying the dehydrated food with a liquid such as water or any water based food items, or any kind of fluid suitable for nutrition and suitable to replace the formerly removed water.

**[0033]** *Water activity ( $a_w$ )* of a product means a value indicative of a ratio of partial vapor pressure of water in that product to a partial vapor pressure of pure water under standard state. Water activity is an important aspect for food product design and food safety. If a product is kept below a certain water activity, then microbial and fungal growth is inhibited. This results in a longer shelf life. Water activity values can also help limit moisture migration within a food product made with different ingredients. Higher  $a_w$  substances are more likely to support microbial and fungal growth. For example, microbes usually require at least 0.91 water activity, and fungi at least 0.7 water activity for growing. Water activity is used in many cases as a critical control point for Hazard Analysis and Critical Control Points (HACCP) programs. However, it is very difficult to equate the microbial growth potential with water content. Further,  $a_w$  values were not universal, but specific to each food product. The growth of microbes is inhibited at specific water activity values.

**[0034]** *Dal* is a dried pulse (lentil, pea or various types of bean) which has been split. The Dal or pulses are edible leguminous seeds, such as peas, beans, and lentils etc, which have long been recognized as an important and inexpensive component of the human diet, providing a rich, low-fat source of protein, complex carbohydrates and dietary fibre. The outer hull is usually stripped off before use. In some cases, the dal is used without removing the outer hull. The word dal is also used to name the thick stew prepared from these pulses, an important part of Indian, Nepali, Pakistani, Sri Lankan, Westindian, and Bangladeshi cuisine. It is regularly eaten with rice in southern India, and with both rice and roti (wheat-based flat bread) throughout northern India and Pakistan as well as Bangladesh, East India, and Nepal.

[0035] The present disclosure provides a dehydrated fried snack of one or more pulses characterized in that the dehydrated fried snack having moisture content of less than 5% w/w, water activity value of less than 0.5 and shelf life upto 6 months.

[0036] In an embodiment, the dehydrated fried snack is a snack of pulse that is uradvada  
5 or dal vada.

[0037] In another embodiment, the dehydrated fried snack is made from at least one pulse selected from black-gram, yellow pigeon peas black chickpeas, yellow split-peas, split-mung beans or a combination thereof.

[0038] In another embodiment, the dehydrated fried snack is made from at least one  
10 pulse selected from black-gram, yellow pigeon peas black chickpeas, yellow split-peas, split-mung beans or a combination thereof and rice or rice flour, wherein rice or rice flour is added to the pulse upto 1 to 10 % weight by weight of at least one pulse.

[0039] In another embodiment, rice or rice flour is added to the pulse upto 1 to 10 % weight by weight of pulse for improving taste or crispness of the fried snack.

[0040] Another aspect of the disclosure provides a method of preparing dehydrated fried  
15 snack as mentioned above.

[0041] The said method of preparing a dehydrated fried snack, involving:

- a. preparing a dough batter of at least one pulse, the dough having bulk density value between 0.80 and 0.97 g/ml
- 20 b. loading the dough batter into hopper,
- c. dropping the batter, in form of predetermined shapes through a die into a pre-heated oil tray for frying, wherein the pre-determined shapes of batter forms an edible snack on frying,
- d. soaking the edible snack in salted hot water for 10 to 60 minutes,  
25 preferably 30 to 45 minutes and squeezing the soaked snack for removing water,

followed by freezing at a temperature in the range of -25 to -5 Deg C, preferably between -18 and -12 Deg C to obtain frozen snack, and

5 e. vacuum drying the frozen snack for a period between 5 and 15 hours, preferably 10 to 11 hours at a temperature in the range of 30Deg. C to 50Deg. C, and cooling to room temperature to obtain dehydrated fried snack having moisture content of less than 5% w/w and water activity value of less than 0.5.

[0042] In another embodiment, the dehydrated fried snack is packed appropriately i.e. nitrogen filled pack etc.

10 [0043] Another aspect of the disclosure provides a method of preparing of the batter having bulk density in the range of 0.8 to 0.97 grams / ml by soaking and grinding of the at least one pulse.

15 [0044] In yet another aspect, after grinding, the batter is kept in a container for 2 to 5 hours at a temperature in the range of about 20 to 35°C for fermenting and or stabilizing the batter in such a way that the batter's volume is increased by 30 to 50 percent in the container from the original volume. It is preferred to keep the batter for 2 to 3 hours to obtain increase in the volume of about 40 percent compared to original volume i.e. before fermentation.

20 [0045] In another aspect, about 1 to 10 w/w % of soaked rice or rice flour is added during preparation of the batter. Further, finely cut vegetables and additives such as cumin seed, ginger and asafetida are added to the batter during preparation.

[0046] Another embodiment of the disclosure provides an edible fried snack which can be consumed directly without soaking, freezing, and vacuum drying steps as described above.

25 [0047] Another embodiment of the present disclosure provides a system for preparing a fried snack wherein the system has a die having plurality of holes, which is attached to the bottom portion of a hopper. The hopper is adapted to receive batter and supply to the

die. The hopper is provided with at least two rollers and mounted on the die. The at least two rollers are capable of rotating in opposite direction in order to homogenize the batter and pushing the batter through the plurality of holes of die to form a pre-defined shape of batter. The system allows use of different dies with holes having varying thickness and varying diameter to produce different shape and size of the fried snack.

[0048] In an embodiment of the present disclosure, the system is further provided with at least one cutter coupled to the die, wherein the at least one cutter is adapted to cut the pre-defined shaped batter at regular intervals in accurate quantity to form a dough of batter.

10 [0049] In an embodiment of the present disclosure, the dough shaped batter is discharged into an oil pan for frying, wherein the frying of the dough shaped batter forms the fried snack.

[0050] In an embodiment, the oil pan is filled with edible oil, and wherein the edible oil is heated to a predetermined temperature for frying the dough shaped batter. The frying of the pre-defined snack is carried out at a temperature in the range of 155 to 175°C. The temperature of the edible oil is maintained by placing heat source such as LPG burner or any other means to get desired temperature for frying the pre-shaped batter.

[0051] In another embodiment of the disclosure in which one or more antioxidants may be added to the edible oil. The antioxidant prevents oxidation of the edible oil thereby sediment formation is avoided. This helps in continuous use of the edible oil for frying. The quantity of antioxidant added to the oil is between 0.5 to 4.0 percent by weight.

[0052] In another embodiment of the disclosure, the antioxidant is selected from natural antioxidants such as ascorbic acid, tocopherol, carotene; and synthetic antioxidants such as butylated hydroxyanisole(BHA), butylated hydroxytoluene(BHT), propyl gallate(PG) and tertiary butyl hydroquinone (TBHQ).

[0053] The pre-shaped batter is fried for required duration and it is depend on for type of batter, thickness, and shape of the batter. In case of uradvada, the batter is fried in the oil between one to five minutes.

5 [0054] In another embodiment, one or more paddle is mounted on the oil pan, wherein the paddle is adapted to rotate about its longitudinal axis thereby pushing the edible oil in the oil pan in order to maintain a uniform temperature of oil in the oil pan. This also facilitates the movement of dropping from the die to other side of the oil pan.

10 [0055] In yet another embodiment of the disclosure, the system is provided with one or more temperature sensors which are coupled to the oil burner for sensing the temperature of the oil, and wherein the burner is switched-off when the temperature of the oil, sensed by the one or more sensors, is greater than the predetermined temperature. Similarly, the Controller controls the rotation of the paddle

15 [0056] In another embodiment, the system is provided with a microprocessor controller for controlling thickness of dough batter; for the speed movement of the rollers; for moving the cutter for cutting the batter; for setting the frequency of dropping of pre-shaped batter into oil pan; discharging the pre-shaped batter into the frying pan, for controlling rotational movement of paddle; for controlling the operation of heating source (i.e. ON/OFF) depending upon the temperature required for maintaining the uniform temperature of the edible oil.

20 [0057] The discharging of pre-shaped batter depends upon the number of holes in the die, and number of discharging required for optimum use of oil pan for frying the pre-shaped snack. For example, the die may have 7 holes and each discharge operation pushes pre-shaped batter through the seven holes. One or more discharge happens depending upon the number of vada's required. The hopper is provided with one or more pins having  
25 sufficient diameter which makes a hole in the batter before the batter is discharged from the die to the oil pan. The number of pins is equal to number of holes in the die. In case of certain type of vadas, requirement of hole in the batter is not required and in such case,

there is no requirement of one or more pins in the system or the operation of pin is not activated by appropriate controls.

5 [0058] After the pre-shaped batter is fried for required duration, the fried snack is taken out of the oil and any excess oil is removed by keeping the fried snack in a pan provided with holes at the bottom. Then the fried snack is immersed /soaked in malic acid, salted hot water, or plain water and it is gently squeezed for removing excess water. It is preferred that the fried snack is immersed in malic acid and salt mixed water for one hour preferably 30 to 45 minutes.

10 [0059] The soaking of fried snack in salt water mixed with malic acid is needed prior to freeze drying since the direct freeze drying as practiced by the industry will not work because of the moisture is not in a form that can sublime as needed in a normal freeze drying process and so the desired ultimate end de-hydrated condition is not attained. The soaking in water tends to allow water to get into the porous structure of the fried vada inside and to, form water pockets, and then capture the moisture in the porous structure to  
15 the water phase.

[0060] The soaking in water also tends to displace the surface resident oil that was the result of the frying. This step helps removal of excess oil present in the vada in the fired top surface. So some oil is released into the soaking water tank and some water is absorbed into the vada from the soaking tank.

20 [0061] In another embodiment, the system is provided with a freezing unit and a vacuum drying unit for freezing the water content in the water soaked fried snack and the vacuum drying unit for drying the frozen fried snack.

[0062] Once, the excess water is removed, the product is subjected to freezing to a temperature of -12 to -18°C for 8 to 24 hours. The Freeze drying step makes the entire  
25 water in the vada to sublime and de-hydrate to the extent needed for the ultimate result of the achieving lower water activity level. After freezing the product, the frozen product is subjected to vacuum drying for 5 to 15 hours, preferably 10 to 11 hours to obtain

dehydrated fried snack with moisture content of less than 5 % w/w and water activity of less than 0.5.

[0063] After vacuum drying, the product is cooled to room temperature and then it is packed appropriately such as primary packing and secondary packing. The packaged product is coded with batch number and date of manufacture etc as per regulatory requirements.

[0064] The dehydrated fried snack i.e. the vada so obtained can be taken as such. In addition, the dehydrated vada can be rehydrated and served as sambar-vada, rasam-vada, dhahi-vada etc depending upon the taste requirements of the consumer. Similarly, vadas made from other pulse can be taken as such.

[0065] In another embodiment of the disclosure provides a ready to eat rasam-vada, which comprising the dehydrated vada so obtained as per the process disclosed about and rasam-mix powder.

[0066] Another embodiment of the disclosure provides preparation of ready to eat rasam-vada by adding the dehydrated vada and the rasam mix to a container and pouring required amount of hot-water to the above container, keeping the container for about 5 to 10 minutes under closed condition, mixing the contents by shaking the closed-container for rehydrating the vada to obtain ready to eat rasamvada.

[0067] Another embodiment of the present disclosure provides a typical recipe for preparing dehydrated fried snack i.e. dehydrated vada:

[0068] Soaking & Grinding: Dal about 80 to 90 percent weight. The dal is a mixture of various pulses such as black gram, moong dal etc; Water for grinding 4.5 to 6.0 percent weight, Baking Soda 0.35 - 0.60; Vegetable oil such as Palmolein - 3.5 to 4.5 and Antioxidant 0.10 to 0.25 to get batter. To the above batter, ginger extract - 3 to 4; cumin seed -1 to 2 and asafetida - 0.75 to 1.15, are added to the batter (all values expressed in percentage of total weight) and mixed thoroughly.

[0069] Deep frying: For deep frying the batter to obtain fried snack (i.e. vada), about 50 to 70 kgs of vegetable oil such as Palmolein oil is taken in a pan and the oil is heated to about 155 to 175 deg C. It is preferable an antioxidant of about 3 to 4 % is added to the vegetable oil kept in the pan.

- 5 [0070] Soaking of vadas in salted warm water: The above obtained fried snack is immersed in warm water mixed with cooking salt 0.2 to 0.3 percent weight and malic acid in the range of 0.05 to 0.065 percent weight for 10 to 60 minutes. Then, excess water is removed from the soaked vada and is subjected to freezing and vacuum drying to get final dehydrated fried vada having shelf life of upto 6 months.
- 10 [0071] Figure 1 represents side view of arrangement of system for preparing fried snack. The system having an oil pan (8) for keeping edible oil and the edible oil is used for frying pre-shaped snack discharged from a die (1) attached to a hopper (3); where is oil pan is kept on a frame; a heating source (10) such as LPG Burner below the oil pan for heating the edible oil. The operation of the burner is controlled by a control unit (9)
- 15 attached to a side of the frame. The hopper is attached to the top of die. The Hooper is provided with atleast two Teflon type rollers (2), is connected to a gear motor (7) , and is operated by the Controller (5). The die is having one or more holes for receiving appropriate quantity of homogenized batter before discharging the pre-shaped batter to the oil pan. The hopper is provided with one or more pins for making holes in the batter
- 20 and to form pre-shaped batter before discharging the pre-shaped batter to the oil pan. Figure 2 represents top view of system for preparing fried snack. Figure 3 represents a flow chart of preparing dehydrated fried snack

[0072] Example

STANDARD RECIPE OF VADA/Batch		
PROCESS	INGREDIENTS	RANGE (KGS)
Step 1: Soaking	Black gram dal	20 -25

Grinding	Moong dhal -Big (without skin)	20-25
	Water (for grinding)	2.5-3.5
	Baking Soda	0.2-0.3
	Palmolein	1.9-2.5
	Antioxidant 4%	0.1-0.15
Step 2: Mixing	Ginger Extract	1.5 -2.2
	Cumin seed	0.75-1.0
	Asafoetida	0.4- 0.6
Step 2: Deep frying	Palmolein	50-67
	Antioxidant 4%	2.0-2.8
Step 3: soaking of vadas in salted warm water.	Salt	0.25-0.35
	Malic acid	0.06-0.07
	Water	90-120
Total Qty (RM) Kgs		195-250
Batter wt (Kgs)		75-95
Total No of Cooked vadas (14 g/Vada) Nos		3000-4000
Cooked wt (14 gms *3600 nos) Kgs		40-56
Total No of Dehydrated Vadas (7 g/Vada) nos		3000-4000
Dry wt (7 gms *3600 nos) Kgs		22-28
Moisture Content		3 to 5%
Water activity		Less than 0.5
Shelf life		Up to 6 months

[0073] The above recipe may be modified as per consumer's taste requirements.

[0074] List of parts referred in the drawings.

- (1) - Die or vada die. The die has about 7 holes, optionally with pins for forming vada shape.
- 5 (2) - Two rollers push the batter to the die. The rollers may be made of Teflon material.
- (3) - Hopper for the batter, is generally V shaped.
- (4) - Cutter for cutting the batter passed through the die. It is generally a wire attached to an appropriate mechanism.
- 10 (5) - Touch screen PLC
- (6) - Paddle leaf two numbers located both ends of the oil pan and connected to a gear motor, which circulates the oil in the pan for keeping the temperature of the oil uniform and also facilitates the movement of the discharged batter from the die to other end.
- 15 (7) - Gear motor
- (8) - Oil pan
- (9) - Control unit
- (10) - Heating source normally LPG burner
- (11) - Operator heat shield (s)
- 20 (12) - Stopper for the fried snacks and manually removed and kept in a tray attached to one end of the oil pan which removes the excess oil.

[0075] The main advantages of the system of the present application are:

1. The unit is suitable for continuous operation and large scale production of fried products where the pre-frying product is in the form of a batter.
- 5 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 and temperature of the oil by means of controls.
- 10 3. The unit is simple to operate for frying and discharging vada continuously in a predetermined shape and size.
4. The freeze drying equipment is capable of providing a means to de-hydrate the friedvada to the desired water activity level.
5. The unit is economically cheaper and hygienic.
6. Less charred deposits and residuals in the fryer due to less movable parts in the oil pan
- 15 7. The unit can also be used for other products similar to uradvada.
8. Easy to dismantling, and easy to clean.

[0076] Although the subject matter has been described in considerable detail with reference to certain examples and implementations thereof, other implementations are possible. As such, the spirit and scope of the appended claims should not be limited to the description of the preferred examples and implementations contained therein.

20

I / We claim:

1. A dehydrated fried snack of pulse comprising at least one pulse characterized in that the dehydrated fried snack having moisture content of less than 5% w/w, water activity value of less than 0.5 and shelf life upto 6 months.
- 5 2. The dehydrated fried snack as claimed in claim 1, wherein the snack of pulse is uradvada or dal vada.
3. A dehydrated fried snack as claimed in claim 1 wherein the at least one pulse is selected from black-gram, yellow pigeon peas black chickpeas, yellow split-peas, and split-mung beans or a combination thereof.
- 10 4. A method of preparing a dehydrated fried snack as claimed in any one of claims 1 - 3, said method comprises of:
  - a. preparing a dough batter of at least one pulse with required quantity of water, the dough having bulk density value between 0.80 and 0.97 g/ml,
  - b. loading the dough batter into hopper,
  - 15 c. dropping the batter, in form of predetermined shapes into a pre-heated oil kept at a temperature ranging between 155 and 175°C in a tray and frying it for 1 to 10 minutes or until the snack turns to golden yellow color, wherein the pre-determined shapes of batter forms an edible snack on frying,
  - 20 d. soaking the edible snack in 0.2 to 0.3 percent weight salted hot water mixed with 0.05 to 0.065 percent weight of malic acid for 10 to 60 minutes, and squeezing the soaked snack for removing water, followed by freezing at a temperature in the range of -25 to -5°C for 8 to 24 hours, to obtain frozen snack, and
  - 25 e. vacuum drying the frozen snack for a period between 5 and 15 hours, at a temperature in the range of 30°C to 50°C, and cooling to room temperature

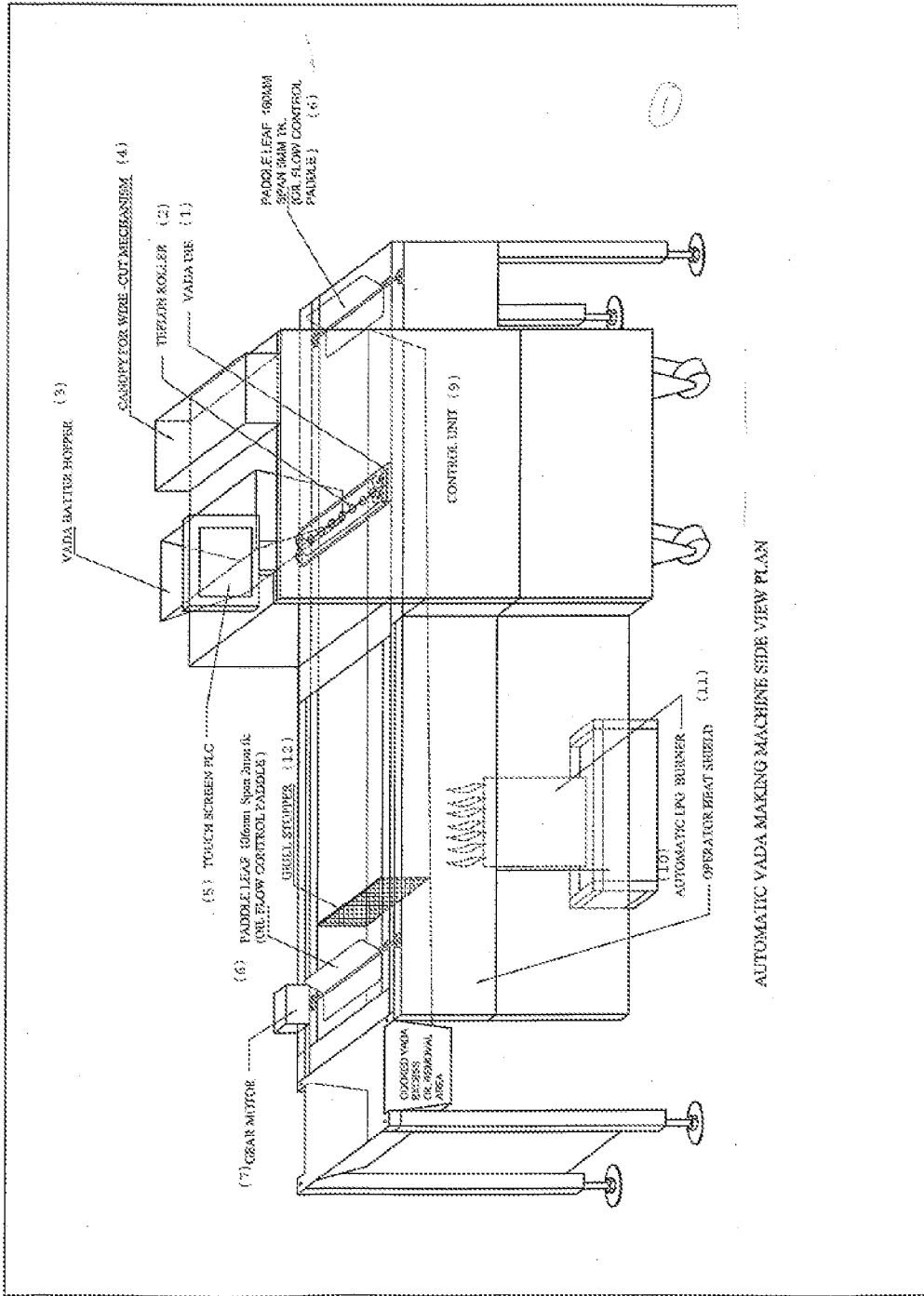
to obtain dehydrated fried snack having moisture content of less than 5% w/w and water activity value of less than 0.5.

5. The method as claimed in claim 4, wherein the preparing of the batter of at least one pulse comprising soaking and grinding of the at least one pulse to obtain batter having a bulk density in the range of 0.80 to 0.97 g/ml.
6. The method as claimed in claim 5, wherein the preparation of the batter further comprises the step of the addition of at least 1 to 10 w/w % of soaked rice or rice flour .
7. The method as claimed in claim 4, wherein the preparing of the batter of at least one pulse further comprises adding finely cut vegetables and additives selected from cumin seed, ginger extract, Asafoetida, or combinations thereof.
8. The method as claimed in claim 4, wherein the edible snack on frying is consumable as such without soaking, freezing, and vacuum drying.
9. A system for preparing a fried snack, the system comprising:
- 15                   a die;
- a hopper mounted above the die, wherein the hopper is adapted to receive to batter and supply it to the die;
- at least two rollers mounted on the die to rotate about its respective longitudinal axis, wherein the batter supplied by the hopper is homogenized by the at least two rollers; and
- 20                   wherein the die comprises a plurality of holes, and wherein the homogenized batter enters the plurality of holes to form a pre-defined shaped batter for preparing a fried snack.
10. The system as claimed in claim 10, wherein the system further comprises at least one cutter (i.e. wire) coupled to the die, wherein the at least one cutter is adapted to cut the pre-defined shaped batter at regular intervals.
- 25

11. The system as claimed in claim 10, wherein the shaped batter is discharged into an oil pan for frying, wherein the frying of the dough shaped batter forms the fried snack.
12. The system as claimed in claim 11, wherein the oil pan comprises edible oil which is heated to a predetermined temperature for frying.
13. The system as claimed in claim 12, wherein the predetermined temperature is in a range of about 155 degrees Celsius to about 175 degrees Celsius.
14. The system as claimed in claim 9, the system further comprises one or more paddle rotatably mounted on the oil pan, wherein the paddle is adapted to rotate about its longitudinal axis to maintain a uniform temperature of oil in the oil pan.
15. The system as claimed in claim 12, wherein the oil is heated to the predetermined temperature by application of burner, and wherein the burner is mounted below the oil pan.
16. The system as claimed in claim 12, wherein one or more temperature sensors are coupled to the oil burner for sensing the temperature of the oil, and the burner is switched-off when the temperature of the oil, sensed by the one or more sensors, is greater than the predetermined temperature.
17. The system as claimed in claim 9, further comprising a freezing unit for freezing the water soaked fried snack and vacuum drying unit for drying the frozen fried snack to obtain a dehydrated vada having moisture content of less than 5% and water activity of less than 0.5.
18. A method of preparing of a dish selected from dahivada or sambarvada or rasamvada comprises re-hydrating the dehydrated vada for 2- 15 minutes by immersing in the said rehydrated vada in the respective dish.

19. The method as claimed in claim 18, wherein the dehydrated Vada is dipped in water for about 1 to 10 minutes followed by squeezing it to remove excess water and immersing into dahi or sambar or rasam.
20. A method of preparing ready to eat rasamvada comprises, adding the dehydrated vada of claim 1 and a rasam mix powder to a container and pouring required amount of hot-water to the above container, keeping the container for about 5 to 10 minutes under closed condition, mixing the contents by shaking the closed-container to obtain ready to eat rasamvada.

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**FIGURE 3: PROCESS FLOW CHART**