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(56) Related Art
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ABSTRACT

A fryer for food products such as battered and breaded pieces of meat has a main conveyor with forward and return belt paths inside the fryer pan, the belt return dragging the pan bottom sweeping fines to one end for removal. A submerger conveyor prevents products from floating in the cooking oil which enters the fryer from above through oil inlet weirs. A plurality of weirs supply curtains of hot cooking oil in non-turbulent flow onto the food product covering the product as the product is conveyed on the main conveyor. The cooking oil is returned along defined lanes in the pan for reheating outside of the fryer. The food products are removed from the fryer in a cooked condition with the bread coatings intact.

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COMPLETE SPECIFICATION

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INVENTION TITLE:

Improved breaded products fryer

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

1 A-65187/DNM

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3 **Field of the Invention**

4 This invention in general pertains to food products prepared in cooking oil or oil
5 substitutes and concerns more particularly an improved method and apparatus for
6 frying products especially battered and breaded products in a manner whereby the
7 breaded coating remains substantially intact as the product is conveyed continuously
8 through the frying system.

9 **Background of the Invention**

10 A number of successfully marketed food products, chicken, beef, fish, filled dough,
11 vegetables, etc. are prepared by coating or battering the product and covering the coating
12 with bread crumbs or the like and frying thereafter. During the frying step in which the
13 product is either partially or fully cooked, it is highly desirable that as much of the breading
14 or other coating be retained on the product and that a very minimum of the coating slough
15 off into the cooking oil. When particles of the coating break away from the product, this
16 results in a lower production yield and the fines sloughed off contaminate the frying oil.
17 These breading and product fines must be removed from the frying medium on a regular
18 basis to avoid degrading the cooking oil to a point where it must be supplemented by a
19 higher quality oil or else removed for recycling. This event places a high economic burden

1 on control of the cooking oil as well as control on the battered and breaded product.
2 Maintaining a balance between product yield and oil quality has been a challenge which
3 faced food processors over a long period of time. This is true of non breaded and battered
4 products as well.

5 Prior art equipment and techniques were developed in attempts to minimize the
6 removal of breading or other coatings from the underlying food product. In the
7 conventional hot oil cooking fryer substantial turbulence or "boil" is generated when the
8 relatively cold uncooked food product is dropped into the hot cooking oil. This turbulence
9 contributed to removal of portions of coatings and continued to a lesser degree as the
10 product is conveyed through and cooked in the hot oil bath. To overcome this undesirable
11 effect food processors turned to cooking the products in batch cookers where the relative
12 motion between the product and the cooking oil would be quite low, although the initial
13 turbulence or "boil" was always present. Other procedures involved cooking in ovens after
14 applying an oil spray coating as a preparatory step to the oven cooking. Gentle handling
15 of the coated product while cooking was a desired goal but rarely achieved to complete
16 satisfaction for high product yields with high production output.

17 It is highly desirable to minimize the relative motion between the bread and battered
18 product and the cooking medium, whether the cooking medium is cooking oil or processed
19 cooking vapor. This is evident because a rapidly moving cooking medium is more than
20 likely the cause of portions of the bread coating to be removed from the product which
21 thereby reduces the yield on the one hand and produces contamination of the cooking
22 medium on the other.

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Where the choice is made to cook a breaded and batter product in cooking oil there are substantial advantages in using the minimum practical amount or volume of cooking oil. However where the product fryer has a large bath of cooking oil, the large air-oil surface and the consequent exposure of the cooking oil to air causes the oil to degrade. Replacement of the complete oil bath or make-up oil must be supplied to maintain or uphold the desired cooking oil quality. Should the oil degrade significantly, there will be caused an "off taste" to be imparted to the product. This must be guarded against to avoid product rejection for quality control reasons as well as to postpone the costly replacement of the degraded oil. In the prior art use of a reduced volume of cooking oil has been thought to be impractical where high product output is the goal.

Summary of the Invention and Objects

In summary, the invention is comprised of an improved fryer for treating a food product.

According to the present invention there is provided a fryer for treating a food product with hot cooking oil, comprising:

- a housing enclosing a cooking zone;
- exhaust vents to withdraw cooking vapors;
- a pan for retaining cooking oil;
- an endless conveyor for transporting food product through the cooking zone, on a conveyor belt, through which cooking oil may flow;
- a plurality of cooking oil distribution stations extending laterally of, and above, the conveyor and substantially the full width thereof, for treating the food product, as it is carried upon the conveyor through the housing, characterised in that:
 - an oil distribution station comprises:
 - a reservoir, bounded by a weir, for overflow oil spillage, and flow downwardly therefrom, in a continuous curtain stream, to enrobe an underlying food product, and then through the supporting belt into an oil retention pan;
 - an oil feed circuit, serving each station with an inlet beneath the oil level



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whereby, as oil is delivered over the weir, the reservoir is continuously supplied with oil.

The invention also provides a continuous process for treating a food product such as one typically carrying a pre-cooked coating that is fragile and easily dislodged in the cooking operation, comprising the steps of providing a fryer having an endless conveyor including a conveyor belt through which cooking oil can flow,

providing a volume of cooking oil for conduction to the fryer, placing such food products with the fragile coating on the conveyor at a loading station for treatment in the fryer and then moving the food products to an unloading station while dispensing from above the conveyor a smooth flowing curtain of hot cooking oil onto the food products carried on the conveyor,

and controlling the oil flow so that it flows downwardly continuously in a curtain of oil for covering and coating the food product on the conveyor,

and then removing the treated food products from the fryer at the unloading station.

A submerger conveyor may be provided arranged superimposed on the main conveyor, for submerging products which tend to float. A plurality of cooking oil inlet distribution stations are spaced longitudinally apart along said main conveyor and are arranged above the product carrying conveyor belt a distance sufficient to permit the product to pass thereunder. The cooking oil distribution stations extend substantially the full-width of the conveyor belt for treating the food products as they are carried through the fryer housing. Each cooking oil inlet distribution station includes a cooking oil reservoir of relatively small surface area exposed to the steam/air atmosphere and equipped with at least one overflow weir permitting the cooking oil to flow thereover in an unbroken vertical curtain downwardly onto and over such food product carried upon the conveyor belt. A cooking oil feed conduit serves to supply each cooking oil distribution station, the feed conduit having multiple discharge openings disposed in the reservoir below the atmosphere-oil surface level so that as oil flows over the weir in a curtain enrobing the product, the reservoir is resupplied with oil beneath the oil liquid level.



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Another feature permits cooking a product while it is fully submerged in cooking oil in which application the distribution station provides for the gentle return to the fryer of the externally heated cooking oil while maintaining a substantially uniform oil temperature along the length of the fryer.

- 5 In a preferred embodiment the volume of cooking oil utilised is substantially less than that in prior art fryers of similar capacity and wherein the tendency of oil to degrade is correspondingly less than in prior art fryers.

- Preferably the conveyor is arranged in a fryer pan such that the return run of the conveyor continuously sweeps the conveyor bottom moving loose bits of product, crumbs and other fines to a fines removal facility or oil outlet sump on the
10 fryer which may be positioned proximate to the product inlet end of the fryer.

The product conveyor belt may be arranged with a return run outside of the fryer pan and with an oil return sump positioned proximate to the product discharge end of the fryer.

- 15 The fryer may include a product hold-down conveyor superimposed upon the principal product conveyor.

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The next page is page 7

1 These and other objects of the invention and advantages from its use will become
2 more apparent from the detailed description which follows, taken in connection with the
3 accompanying drawings.

4 **Brief Description of the Drawings**

5 FIG. 1 is a plan view from above of the improved breaded product fryer configured
6 and operating according to the principles of the present invention;

7 FIG. 2 is a longitudinal sectional view, partially broken away, taken in the direction
8 of the arrows 2-2 in FIG. 1;

9 FIG. 3 is a fragmentary, longitudinal sectional view on an enlarged scale taken from
10 the encircled portion in FIG. 2;

11 FIG. 4 is a fragmentary perspective view taken from above of the subject matter
12 shown in FIG. 3;

13 FIG. 5 is a lateral sectional view like taken in the direction of the arrows 5-5 of FIG.
14 2;

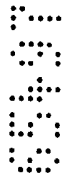
15 FIG. 6 is a longitudinal section view, partially broken away, showing another
16 preferred embodiment of the present invention;

17 FIG. 7 is a fragmentary sectional view on an enlarged scale taken from the encircled
18 portion of FIG. 6;

19 FIG. 8 is a plan view of the breaded product fryer shown in FIG. 6, but with the hood
20 and conveyor belts removed to clearly illustrate the cooking oil return flow pattern; and

21 FIG. 9 is an elevation view of still another embodiment of the invention shown with

- 1 portions broken away and showing a conveyor belt having a return path outside of the fryer
- 2 pan.



1 **Description of the Preferred Embodiment**

2 An improved breaded products fryer 10 constructed in accordance with and
3 embodying the principles of the present invention is shown in the drawings, referring
4 particularly to FIGS. 1 and 2. The improved fryer 10 includes a frame 11 supported by four
5 upstanding legs 12 provided with level adjustment mechanisms 13 which are operable to
6 enable a uniform, accurate vertical flow pattern of the cooking oil which will be described
7 in more detail below. It is desirable that the frame which supports a pan 14, which retains
8 the cooking oil supply prior to its return for reheating, be maintained level both fore and
9 aft as well as side to side for smooth even flow of the oil curtains.

10 A hood 16 is mounted on the frame 11 and is equipped with an exhaust stack 17
11 which serves for the removal of cooking vapors generated beneath the hood 16 and to
12 enable those vapors to be conveyed to a treatment facility (not shown) so as to minimize
13 atmosphere contamination.

14 A product carrying conveyor 18 is arranged in the pan 14 for moving products 19
15 deposited thereon from an inlet 21 to an outlet 22. The product conveyor 18 is configured
16 with an inside return so that the conveyor belt, which may be of woven wire mesh or other
17 suitable material affording oil pervious construction, returns along the bottom of the pan
18 14 moving from right to left, as viewed in FIG. 2, so as to sweep any product fines or
19 residue into the sump 23 for removal therefrom through the conduit 24. Desirably, the
20 width of the conveyor 18 is such that it extends substantially the full width of the fryer so
21 that the return run will sweep the pan bottom completely of product fines. It will be
22 understood that the product carrying conveyor 18 receives products transferred thereto

1 through the fryer inlet 21 at the left of FIG. 2 and conveys the product towards the fryer
2 outlet 22. The outlet end of the conveyor is inclined upwardly so as to raise the treated
3 food products 19 out of contact with the cooking oil and thence for subsequent removal
4 from the fryer 10. The top or product carrying run of the conveyor 18 may operate either
5 above or below the oil liquid level maintained in the pan 14. The selection and control of
6 the cooking oil depth in the pan 14 with respect to the food products on the conveyor top
7 run is determined by the product cooking specifications and more specifically whether it
8 is desirable to have the lower portions of the product conveyed through the cooking oil or
9 to be moved above the cooking oil liquid level. The product conveyor 18 is driven through
10 a variable speed motor drive 23 (FIG. 1) which affords an accurate rate of progression for
11 treatment of the products 19 moving through the fryer 10.

12 Typical products 19 which are treated in the fryer 10 include, for example, onion
13 rings as well as other vegetables; meats such as chicken and beef as well as fish. These
14 food products may be first dipped in a viscous batter and then covered with a layer of
15 bread crumbs or similar coating which adheres to the batter, thus increasing the weight of
16 the product. Unless handled carefully in the cooking operation, a portion of the breading
17 or other coating will not adhere to the product and will fall into the cooking oil which is
18 undesirable as discussed above. Described below are steps which materially reduce the
19 amount of bread and batter material stripped from the product through the cooking
20 operation.

21 Certain products tend to move, tumble or shift as they are carried on the conveyor
22 18 or to "float" in cooking oil residing in the pan 14. For these reasons it is desirable to

1 arrange a hold-down conveyor system 26 under the hood such that the lower run of the
2 hold-down conveyor is positioned to engage the upper surfaces of the product 19 and
3 maintain the food product in its initial position on the main conveyor during the cooking
4 process . The vertical position of the hold-down conveyor may be varied to accommodate
5 products 19 of different vertical dimensions. As is the case of the principal product
6 conveyor 18, the conveyor belt of the hold-down conveyor 26 is of wire mesh construction
7 to permit the easy flow there through of the cooking oil dispensed from the cooking oil
8 distribution stations 27 arranged above the conveyor 18 carrying the products 19, as
9 clearly shown in FIGS. 2 and 3. One desirable oil level 30 is indicated in FIG. 2 as
10 coextensive with the lower run of the conveyor 26. It will be understood that the conveyor
11 26 may be shifted vertically to either engage or be disengaged from a particular size of
12 product and the oil level 30 may be adjusted to accommodate particular processes and
13 products.

14 The oil distribution stations 27, best shown in FIGS. 3 and 4, extend laterally of the
15 conveyor belt 18 and are substantially co-extensive of the width of the conveyor belt so
16 that the full width of the belt may serve as a food cooking area as shown in FIG. 5. The
17 conveyor belt and the distribution stations extend fully with only marginal clearances
18 between the two sides of the fryer as indicated in FIG. 5. The stations 27 serve to
19 distribute or pour hot cooking oil onto the products 19 carried by the belt 18 through at
20 least one and preferably a plurality of curtains 28 of smooth, virtually ripple-free cooking
21 oil. It will be understood that the term "cooking oil" as used herein is intended to embrace
22 oil substitutes such as *Olean* or *Olestra* which are trademarks of Proctor and Gamble, Co.

1 The incoming hot cooking oil flows from a laterally extending, horizontally disposed trough
2 29 of relatively small volume as compared to that of the pan. The trough 29 is provided
3 with two upwardly rising, smoothly contoured shoulders 31 which merge into descending
4 guide walls or skirts 32. Thus there is established for each distribution station 27 two oil
5 inlet weirs that generate two smooth flowing curtains of cooking oil. Cooking oil is
6 supplied to each trough 29 through a delivery conduit 33 which is provided with oil
7 discharge openings along its bottom perimeter, the openings being positioned below and
8 between the shoulders 31. Incoming oil flows from the conduit 33 to fill the trough 29 from
9 the bottom up to the level of the shoulders from whence the weir action occurs. The
10 spaced apart, horizontally disposed shoulders 31 serve to define or establish the top oil
11 surface in the distribution station. This surface is above the oil discharge openings of the
12 delivery conduit 33. Thus, as incoming oil flows into the trough 29 a corresponding volume
13 of oil flows from the top or overflow oil surface. Thus the cooking oil overflows over the
14 smoothly contoured shoulders 31 and downwardly along the guide walls or skirts 32. This
15 creates the weir action and establishes the flow curtains 28 of cooking oil which contact
16 the products in an enrobing action for cooking.

17 The vertical drop of the oil or vertical length of the oil curtains is dictated somewhat
18 by the product height and for this reason the distribution stations include means 35
19 permitting vertical adjust for raising or lowering and accurate leveling of the stations with
20 respect to the main conveyor belt.

21 The delivery conduits 33 are supplied from a manifold 34, FIGS. 1 and 4, including
22 the cross supply tubes 36. The manifold 34 is connected to an oil supply from a heat

1 exchanger or the like (not shown) for delivery of oil to the distribution stations 27 at a
2 precise flow rate and temperature.

3 Once deposited upon and having flowed over the product, the cooking oil then flows
4 through the conveyor belts and through openings 38 in the deadplate or false bottom 37,
5 shown best in FIG. 4. The areas and locations of the openings 38 may be selected to
6 compensate for dynamic pressure differences in the oil flowing under the deadplate 37 so
7 as to minimize any longitudinal oil flow through the product zone above the conveyor 18.
8 The oil flows longitudinally along the pan 14 as indicated by the lower arrows in FIG. 2 in
9 the relatively shallow space between the deadplate 37 and the pan bottom in a flow pattern
10 which is substantially uniform across the full width of the fryer. From one viewpoint, the
11 pan 14 serves merely to contain the cooking oil for recirculation and reheating as
12 contrasted to the prior art fryers where all of the product cooking was conducted under
13 turbulent condition within the oil bath maintained in the pan.

14 The oil is discharged through the conduit 24 and is circulated to the heat exchanger
15 (not shown) for reheating and return to the fryer at a preselected input initial temperature.

16 For certain applications, the deadplate 37 may function as a puddler panel as it is
17 arranged along the distribution stations 27 and is disposed underneath the infeed run of
18 the conveyor. The panel is co-extensive with the width of the conveyor belt. The panel
19 functions to collect with the openings in the wire belt a meniscus or puddle of hot cooking
20 oil flowing unto it from the oil curtains above. The oil puddle wets the bottom of the food
21 product to transfer additional heat to the product. This is a efficient arrangement to ensure
22 oil treatment to the lower portions and the bottom of a food product where it is undesirable

1 to fully immerse the lower portions of the product in cooking oil.

2 **Operation and Process Examples**

3 An improved breaded products fryer 10 having four oil inlet distribution stations 27
4 each with two oil overflow weirs 31, 32 and a variable-speed product-carrying conveyor
5 18, 23 was operated in accordance with the principles of the present invention. A first
6 group of product samples 19 were fried for a range of processing times in the fryer 10, with
7 sufficient oil level to fully submerge all samples. Another group of product samples were
8 fried in the same fryer 10 but with the oil level below the perforated deadplate 37. Sets of
9 control samples were fried either in a conventional breaded products fryer (not shown) or
10 in a still-bath batch fryer, to provide a basis for comparison of cooking times and finished
11 product quality.

12 **Example 1**

13 Chicken breasts without any coating were fried at 365°F for times between 30
14 seconds and 3 minutes, to compare processing times. There was no measurable
15 difference, as determined by the depth of visible color change, between those samples
16 fried submerged in oil in the improved breaded products fryer 10 and those fried for the
17 same lengths of time in the conventional fryer. Samples fried in the fryer 10 but with the
18 oil level below the perforated deadplate 37 required approximately 25% longer total
19 cooking time to show equivalent depths of visible color change.

Example 2

Thick potato slices without any coating were fried at 365°F for times between 30 seconds and 3 minutes, to compare processing times. There was no measurable difference, as determined by the depth of visible opacity change, between those samples fired submerged in oil in the breaded products fryer 10 and those fried for the same lengths of time in the conventional fryer. Samples treated in the fryer 10 but with the oil levels below the perforated deadplate 37 appeared to require approximately 25% longer total cooking time to show equivalent depths of visible opacity change.

Example 3

Chicken breasts were battered and flour-coated, then fried at 365°F in the breaded products fryer 10 with the oil level below the perforated deadplate 37. The product conveyor 18 was advanced manually to simulate a greater range of weir spacing, number of weirs and processing times. Control samples were fried in a batch fryer for 40 seconds at 365°F.

There was no significant coating loss either from the control samples or from any of the trial samples. Total cooking time required to most closely duplicate the control samples varied between 40 seconds at the closest simulated weir spacing and 80 seconds at the maximum simulated weir spacing.

Example 4

Chicken breasts were battered and coated with "J" crumbs, then fried in the fryer

1 10, for 40 seconds at the closest simulated weir spacing, with the oil level below the
2 perforated deadplate 37. Some were fried directly while others were pre-treated by
3 immersion in a still-bath batch fryer for 5 seconds immediately prior to entering the
4 improved breaded products fryer. Control samples were batch fried.

5 Those samples fried without the pre-treatment showed some coating loss but were
6 otherwise comparable to the control samples. Those samples which were pre-treated in
7 the batch fryer showed negligible coating loss and most closely resembled the control
8 samples.

9 These examples demonstrate the versatility of the fryer 10 and the flexibility of
10 the process enabled by it. Other process steps will occur to those skilled in this field
11 and additions and modifications to the apparatus will be envisioned by those skilled art
12 workers.

13 **Second Preferred Embodiment**

14 A second preferred embodiment of the invention 40 is shown in FIGS. 6-8 and
15 this fryer is constructed in accordance with and embodies the principles of the present
16 invention. Where previously described corresponding parts are indicated in the
17 drawings these are identified with a "prime" (').

18 The fryer 40 has an inclined inlet section of the conveyor 18' as well as an
19 incline outlet section, as is apparent from FIG. 6. The oil level 30' extends over the top
20 of the product 19' or in other words the products are treated in the fryer in a submerged
21 condition. There is no hold down conveyor present in the embodiment 40 which then is

1 most useful for products 19' which do not tend to float or in which the floating of the
2 product in the oil is within the intended operating parameters.

3 Referring particularly to FIG. 7, it will be seen that the bottom run of the
4 conveyor 18' is closely spaced with respect to the pan bottom so as in operation to
5 sweep the bottom of the pan 14'. The top run of the conveyor 18 is guided and
6 supported by lane guides 42 which are so positioned with respect to the fryer bottom to
7 define oil return paths as indicated by the arrows 43 in FIG. 8. More specifically, the oil
8 return paths are from the central portion of the fryer to the side and then to urge the oil
9 to migrate toward the sump 24' for removal from the fryer to a reheating unit. Thus the
10 lane guides 42 serve with the conveyor runs to define oil passageways over the fryer
11 bottom for removal of the oil and its recirculation. Five such lane guides 42 are
12 indicated in FIG. 8 although the number may be higher or lower depending upon the
13 width of the fryer and the return flow rate desired.

14 **Third Preferred Embodiment**

15 A third preferred embodiment of the invention 50 is shown in FIG. 9 and this
16 fryer is construction in accordance with and embodies the principles of the present
17 invention. Where previously described corresponding parts are indicated in the
18 drawing, these are identified with a "prime" (').

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20 The improved breaded products fryer 50 is constructed with parts previously

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identified and in this instance includes a principal products conveyor 43 which is configured for an outside return. That is to say the return of the conveyor does not travel across the inside of the pan, but returns outside of the pan as indicated in FIG. 9. The top run of the conveyor is arranged to sweep the bottom of the pan
5 and to move any fines that develop in the frying process toward the sump 24' which is positioned adjacent to the discharge end of the fryer.

While there has been disclosed above and illustrated in the drawings what is considered to be the preferred embodiments of the present invention and teach those skilled in the art the principles of the applicants' development, the true scope
10 of the invention shall not be limited except as set out in the claims below.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other
15 integer or step or group of integers or steps.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that that prior art forms part of the common general knowledge in Australia.



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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A fryer for treating a food product with hot cooking oil, comprising:
 - a housing enclosing a cooking zone;
 - 5 exhaust vents to withdraw cooking vapors;
 - a pan for retaining cooking oil;
 - an endless conveyor for transporting food product through the cooking zone, on a conveyor belt, through which cooking oil may flow;
 - a plurality of cooking oil distribution stations extending laterally of, and
 - 10 above, the conveyor and substantially the full width thereof, for treating the food product, as it is carried upon the conveyor through the housing, characterised in that:
 - an oil distribution station comprises:
 - a reservoir, bounded by a weir, for overflow oil spillage, and flow
 - 15 downwardly therefrom, in a continuous curtain stream, to enrobe an underlying food product, and then through the supporting belt into an oil retention pan;
 - an oil feed circuit, serving each station with an inlet beneath the oil level whereby, as oil is delivered over the weir, the reservoir is continuously supplied with oil.

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1 2. The apparatus of claim 1 wherein the endless conveyor includes a return run arranged
2 in said pan to sweep the bottom surface of the pan serving to move to one end of the pan
3 any product fines, pieces or particles dislodged during processing in the fryer, and fines
4 removal means arranged at one end of said pan for withdrawal of the fines from the fryer.

5 3. The apparatus of claim 1 and further including a product hold-down conveyor arranged
6 in said housing above the first mentioned conveyor and serving to maintain food products
7 substantially in their original positions during the treatment process in the fryer, the hold-
8 down conveyor being equipped with an oil pervious conveyor belt permitting oil dispensed
9 from said distribution stations to flow freely there through.

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4. The apparatus of claim 1 and further including a deadplate baffle arranged underneath
an upper run of the first mentioned conveyor and configured with openings through said
deadplate baffle to direct cooking oil poured from the distribution stations downwards and
then serving to cause the oil to move generally parallel to the direction of conveyor travel
and underneath the deadplate baffle toward an oil removal station provided in said pan.

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5. The apparatus of claim 1 wherein said cooking oil distribution stations are each
provided with two weirs serving to establish two curtains of smooth flowing cooking oil at
each distribution station.

1 6. The apparatus of claim 1 wherein a plurality of distribution stations are provided in said
2 housing, at least one of said stations being disposed at a different elevation from that of
3 an adjacent station..

4 7. The apparatus of claim 2 wherein said first mentioned conveyor belt is inclined
5 upwardly adjacent to the end of the cooking zone where the product exits the housing.

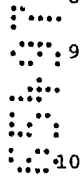


1 8. A continuous process for treating a food product such as one typically carrying a pre-
 2 cooked coating that is fragile and easily dislodged in the cooking operation, comprising the
 3 steps of providing a fryer having an endless conveyor including a conveyor belt through
 4 which cooking oil can flow,
 5 providing a volume of cooking oil for conduction to the fryer, placing such food products
 6 with the fragile coating on the conveyor at a loading station for treatment in the fryer and
 7 then moving the food products to an unloading station while
 8 dispensing from above the conveyor a smooth flowing curtain of hot cooking oil onto the
 9 food products carried on the conveyor,
 10 and controlling the oil flow so that it flows downwardly continuously in a curtain of oil for
 11 covering and coating the food product on the conveyor,
 12 and then removing the treated food products from the fryer at the unloading station.
 13 9. The process of claim 8 and further including providing the endless conveyor with a
 14 return run in substantial contact with the fryer bottom,
 15 and moving product fines to a fines removal zone through the action of the conveyor return
 16 run.

1 10. The process of claim 8 and providing for removal of the cooking oil from the fryer by
2 flowing the oil in spaced apart longitudinal paths in the fryer extending longitudinally of the
3 product conveyor substantially isolated from the food products being conveyed through the
4 fryer.

5 11. The process of claim 8 and providing for supplying the cooking oil in a plurality of
6 curtains extending transversely of the path of the product carrying conveyor.

7 12. The process of claim 11 and providing the cooking oil to the curtains at differing
8 temperatures such that the food products are subjected to varying oil temperatures while
9 being conveyed on the product conveyor.



10 13. The process of claim 8 and maintaining in the fryer the volume of cooking oil at a
11 level below the top run of the product conveyor such that food products carried on the
12 conveyor are not submersed in the cooking oil during treatment.



13 14. The process of claim 8 and maintaining in the fryer the volume of cooking oil at a
14 level above the top run of the product conveyor such that food products carried on the
15 conveyor are at least partially submersed in the cooking oil during treatment.



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15. A fryer substantially as hereinbefore described with reference to the drawings and/or Examples.

16. A process for treating a food product substantially as hereinbefore
5 described with reference to the drawings and/or Examples.

10

DATED this 11th day of July, 2001

15 HEAT & CONTROL, INC.
By its Patent Attorneys
DAVIES COLLISON CAVE



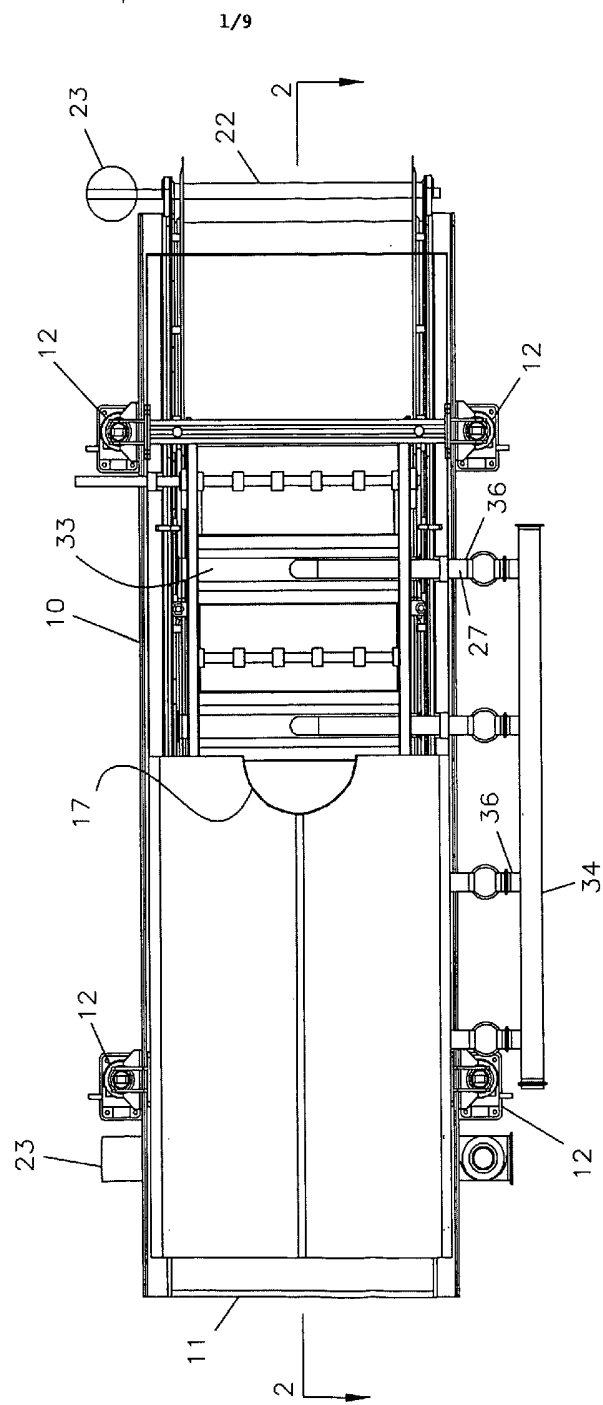


Fig. 1

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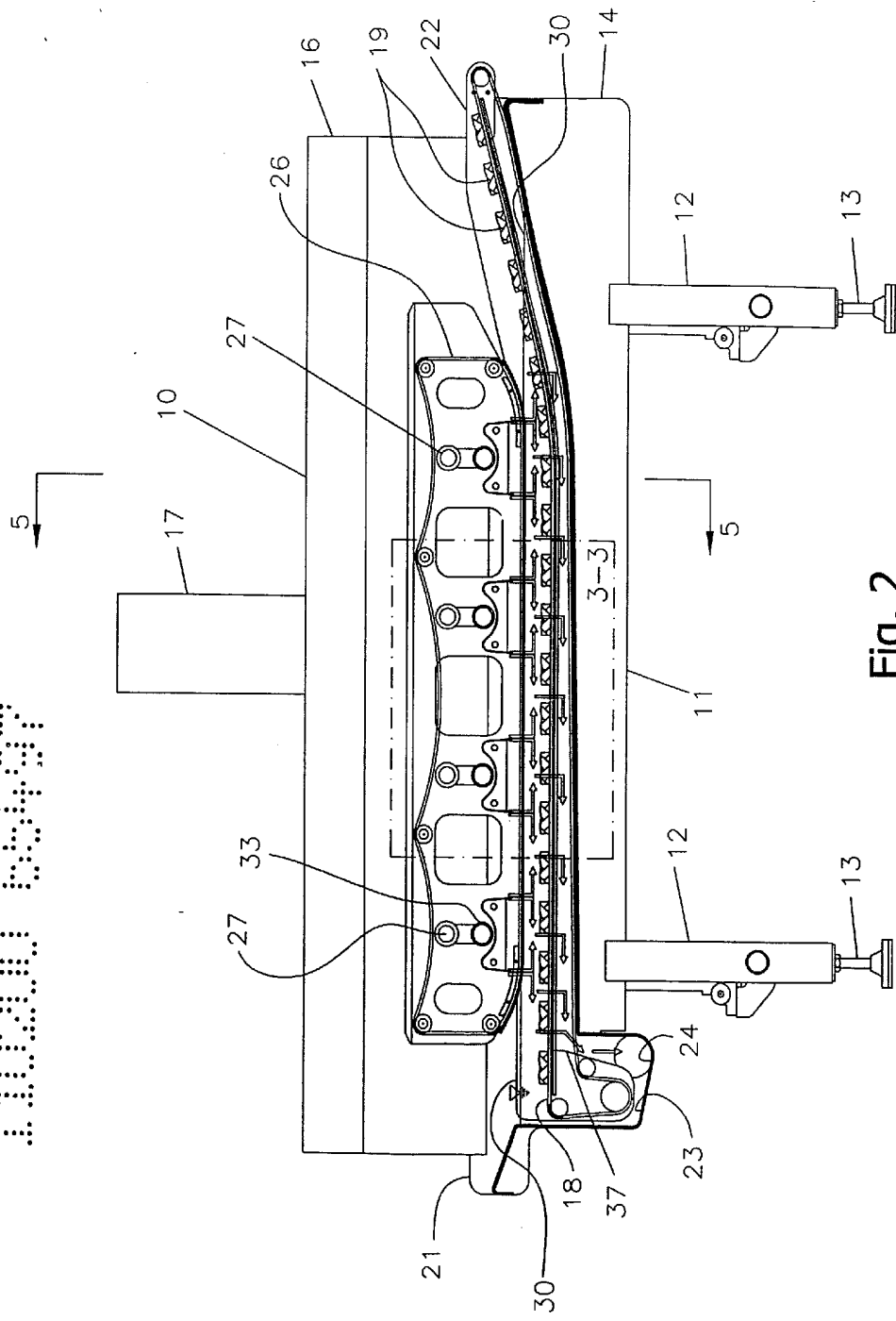


Fig. 2

110300 55433

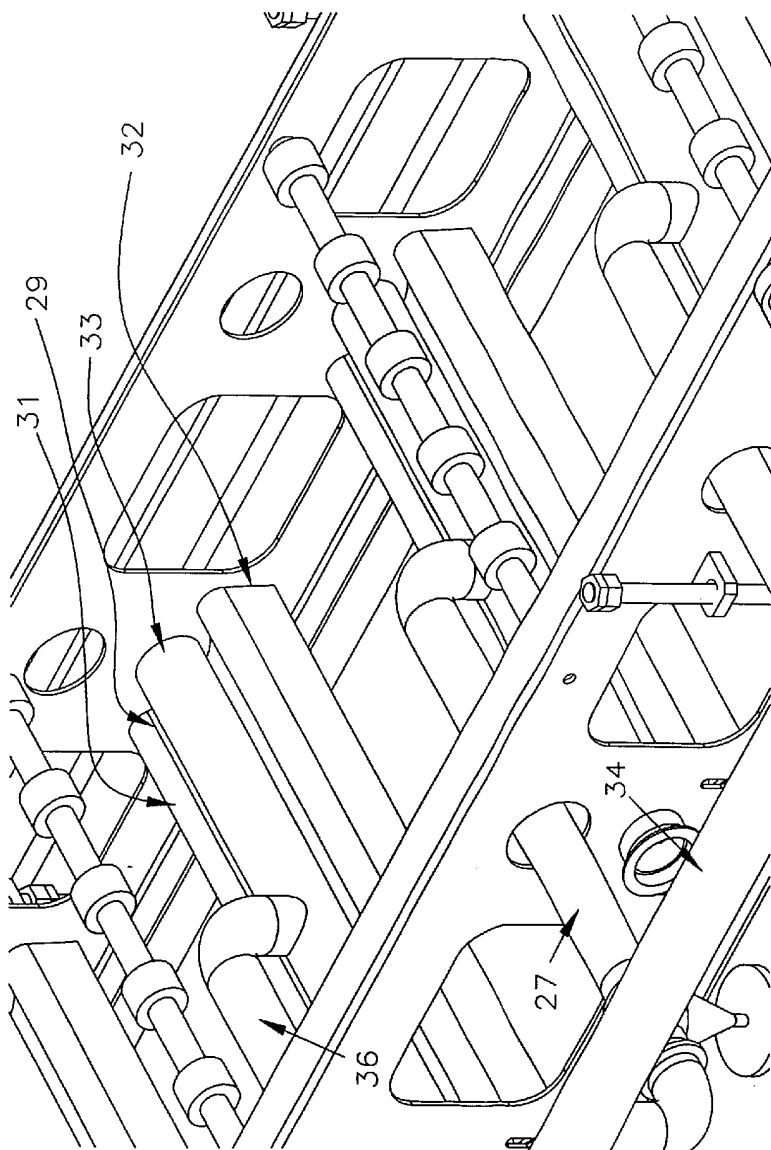


Fig. 4

2 6



Fig. 5

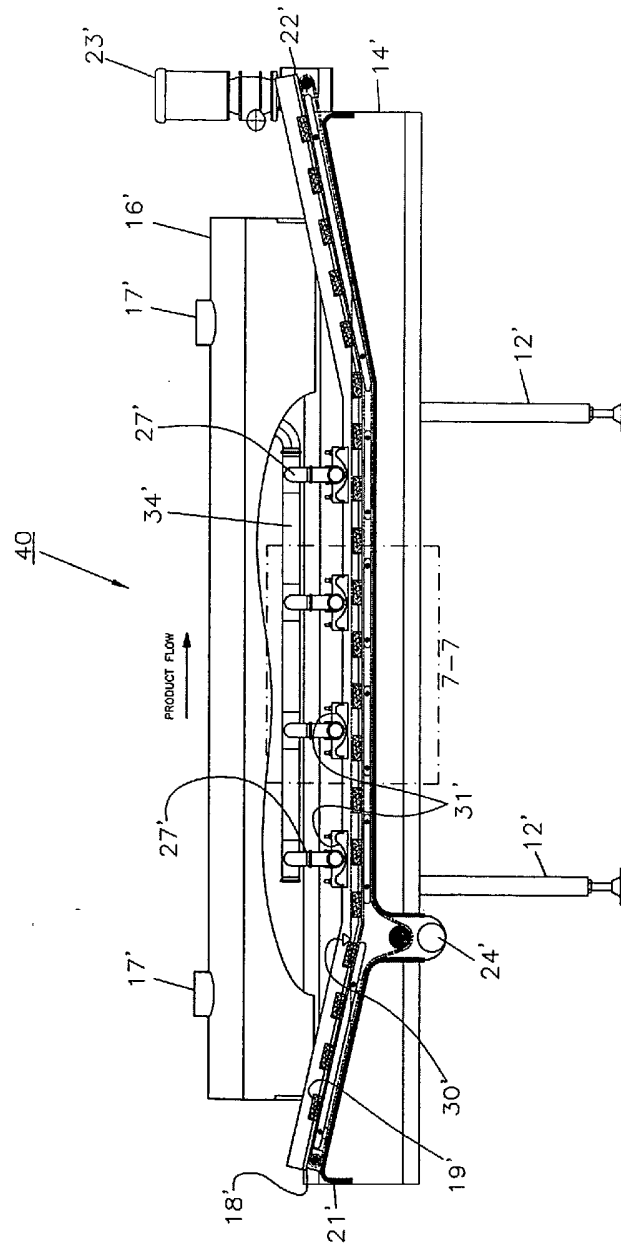


Fig. 6

110300 55437

40

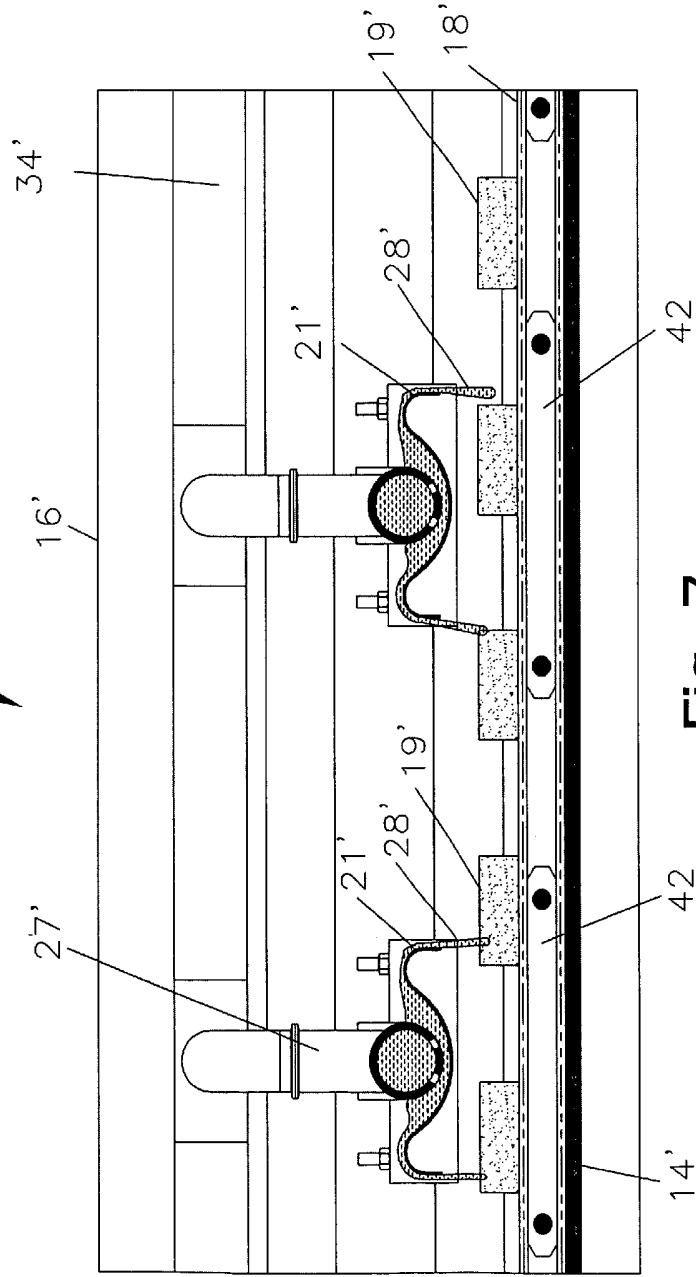


Fig. 7

110300 8593

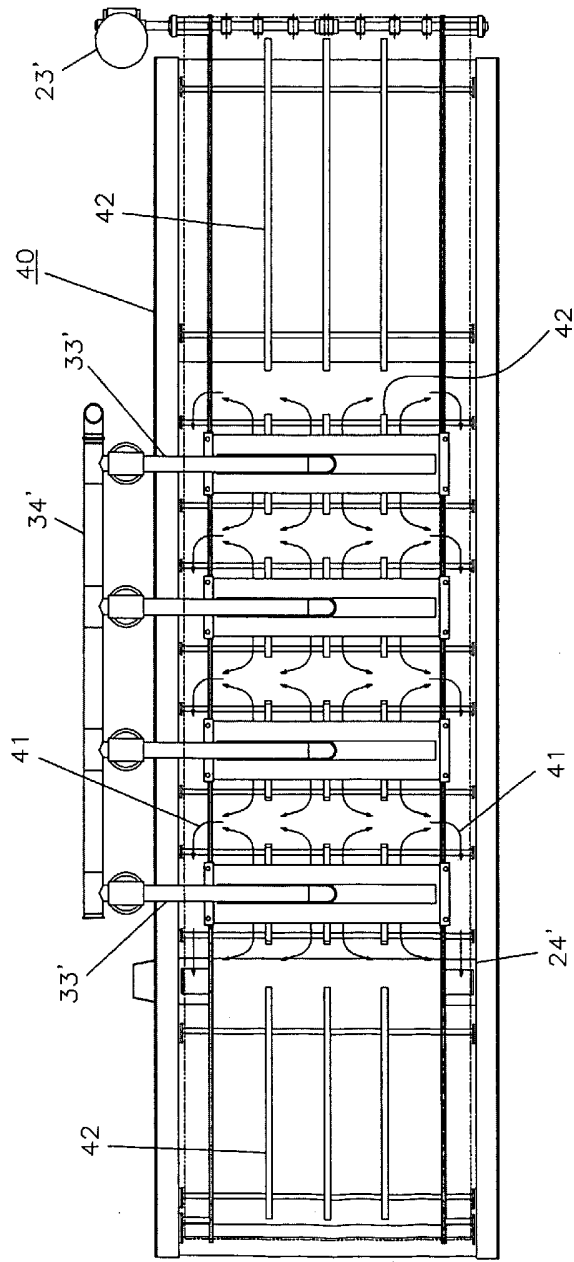


Fig. 8

