MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A
We, ITT INDUSTRIES, INC., of 320 Park Avenue, New York 22, New York 22, State of New York, United States of America, hereby apply for the grant of a Patent for an invention entitled:

"LOW CALORIE BREAD PRODUCT"

which is described in the accompanying complete specification.

Our address for service is:

PATENT DEPARTMENT,
STANDARD TELEPHONES AND CABLES PTY. LIMITED.
252-280 BOTANY ROAD,
ALEXANDRIA, 2015,
SYDNEY, NEW SOUTH WALES,
AUSTRALIA

Dated this thirteenth day of February, 1976,

Authorized Signatory

To: The Commissioner of Patents
Form 7
COMMONWEALTH OF AUSTRALIA
PATENTS ACT 1952-1969
DECLARATION IN SUPPORT OF AN APPLICATION FOR A
PATENT OR A PATENT OF ADDITION
11191/76
In support of the Application made by ITT INDUSTRIES, INC., for a patent for an invention entitled:
"LOW CALORIE BREAD PRODUCT"

I, CHARLES ROBERT HAWKEN,
c/- STANDARD TELEPHONES AND CABLES PTY. LIMITED, 252-280 Botany Road, Alexandria, Sydney, New South Wales, Australia do solemnly and sincerely declare as follows:

1. I am authorised by ITT INDUSTRIES, INC., the applicant for the patent, to make this declaration on its behalf.

2. STANLEY THAYER TITCOMB of 8 Hawthorne Avenue, Portchester, New York, United States of America, and ARTHUR ANTHONY JUERS of 1523 Waddell Street, Baldwin, New York, United States of America, are the actual inventors of the invention, and the facts upon which ITT INDUSTRIES, INC., is entitled to make the application are as follows:

ITT INDUSTRIES, INC., is the Assignee of INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION who are the Assignees of THE SAID INVENTORS.

Declared at Sydney this thirteenth day of February, 1976.

[Signature]

Declarant

To: The Commissioner of Patents
CLAIM 1. A reduced calorie bread product comprising 22 to 25 parts by weight of a cellulose constituent per 100 parts by weight of wheat flour, wheat gluten added as a protein supplement, brown sugar in a reduced quantity compared with the sugar content of standard white enriched bread, and without lard.
The following statement is a full description of this invention, including the best method of performing it known to us:
This invention relates to a low calorie bread and, more particularly to a low caloric white enriched bread.

It has long been desired, and many attempts have been made in the food industry, to produce a low calorie white enriched bread which may be used in place of the standard white enriched bread, since it has become a standard in the industry and widely accepted by young and old alike. Accordingly, sliced white bread has become so common to the consuming public that its volume of consumption has never been approached by any of the other breads combined, i.e. ryes, proteins, rolls, and the like. Contributing to its appeal is the taste, softness, tcastability, texture, and eating quality of white bread. Further, its use for making large number of sandwiches daily has brought its use to the point that there has been no close competitor in satisfying the consuming public.

However, with this standard white enriched bread, there is a definite problem of the amount of caloric intake per bread slice and in some cases, in elderly persons, the white enriched bread has affected their digestive and elimination systems due to the consistency and texture of white bread. It has become extremely difficult for people to diet, as well as for old people to change their eating habits, because of the desire and habits of using white enriched bread. One of the past problems in substituting a low calorie bread for the standard white enriched bread has been the reluctance of the consuming public, children to adults, to reach for the low calorie bread. Many of these factors include: "It did not look the same"; "It did not feel the same"; and "It did not have the same texture and taste as enriched white bread." Therefore, reduced calorie bread has never been accepted by the general public, to their health detriment.
The invention attempts to overcome these problems by providing a reduced calorie white enriched bread of at least 25% while maintaining the standard enriched white bread eating quality and texture, without reducing any mineral or protein value in the new low calorie bread loaf. It is therefore an object of this invention to produce a low calorie bread product which overcomes the prior art problems. It is also an object of the invention to produce a low calorie white enriched bread product having at least a 25% reduction in caloric content as compared to the standard white enriched bread.

According to the invention, there is provided a reduced calorie bread product comprising 22 to 25 parts by weight of a cellulose constituent per 100 parts by weight of total flour.

A feature of the invention is the elimination of some of the caloric contributing ingredients and the addition of ingredients not normally found in white enriched bread while still producing a product having the same size and eating quality and texture of the white enriched bread.

In order to solve the problems inherent in the prior art, it was necessary prior to producing an interchangeable and equally acceptable white enriched low calorie bread to define and set the goals for the degree of caloric reduction possible. It was determined that a much greater than 25% caloric reduction would not make a comparable low calorie bread with any consumer acceptance. It was also determined that prior art attempts for producing a bread with 10 to 15% fewer calories did not have sufficient caloric reduction to have any impact on the consuming public to warrant large scale production of such a minimal reduced calorie loaf. The goal established and finally to be accepted by the FDA is a low calorie enriched white bread having at least
25% reduction in caloric content.

In order to fully appreciate the invention, the following typical standard formulation for white enriched bread according to the prior art is tabulated. The concentrations of ingredients are indicated in parts by weight based on 100 lbs flour and identified according to standards in the industry.

**STANDARD WHITE ENRICHED BREAD**

<table>
<thead>
<tr>
<th>INGREDIENTS</th>
<th>Parts By Weight Based on 100 lbs. Flour</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPONGE</strong></td>
<td></td>
</tr>
<tr>
<td>Wheat Flour, Patent</td>
<td>65.00</td>
</tr>
<tr>
<td>Yeast</td>
<td>2.50</td>
</tr>
<tr>
<td>Yeast Food</td>
<td>0.50</td>
</tr>
<tr>
<td>Hydrated Mono and Diglycerides</td>
<td>0.75</td>
</tr>
<tr>
<td>Lard</td>
<td>3.00</td>
</tr>
<tr>
<td>Water</td>
<td>37.00</td>
</tr>
<tr>
<td>Enrichment &quot;M&quot;</td>
<td>Two Tablets</td>
</tr>
<tr>
<td><strong>DOUGH</strong></td>
<td></td>
</tr>
<tr>
<td>Flour</td>
<td>35.00</td>
</tr>
<tr>
<td>Salt</td>
<td>2.25</td>
</tr>
<tr>
<td>Corn Sugar (dry)</td>
<td>10.00</td>
</tr>
<tr>
<td>Soy Flour and Whey</td>
<td>2.00</td>
</tr>
<tr>
<td>Calcium Sulphate</td>
<td>0.40</td>
</tr>
<tr>
<td>Calcium Propionate</td>
<td>0.10</td>
</tr>
<tr>
<td>Water</td>
<td>24.00</td>
</tr>
</tbody>
</table>

**PROCEDURE:** The procedure for the standard bread is to mix the sponge ingredients in a standard mixer for approximately four minutes and allow the sponge to ferment for approximately four hours at about 76°F. The sponge is then combined with the dough ingredients and mixed for approximately ten minutes. The mixed dough is then allowed to relax for an additional 30 minutes.
before weighing and 10 minutes before shaping into individual loaves which are placed in bread pans and allowed to proof for approximately one hour. The proofed loaves are baked for approximately 21 minutes at 415°F, cooled and sliced.

The foregoing ingredient composition and procedure is established for large commercial bakeries. The sponge and dough ingredients are handled in a manner which facilitates large volume production of bread for shipping and delivering to retail outlets with a minimum of holding time from production of the sponge to purchase by the consumer.

With the foregoing in mind and within the same standard of art in the industry, it was necessary to discover an ingredient mix and procedure in keeping with the standard commercial procedures to produce a loaf having 25% less calories. It was determined from the standard formula that the patent wheat flour content should be reduced, that the lard should be eliminated, and that the corn sugar should be reduced and changed. A wheat protein, gluten, was added in substantial amounts to compensate for the loss in protein value due to the reduction of flour, a selected cellulose was incorporated in precise amounts, and of additional significance, brown sugar was incorporated in reduced amounts and a slight amount of flavouring. The preferred combination is listed in the following example. Example I provides the formulation and method for producing the 25% reduced calorie white enriched bread; the ingredients are indicated in parts by weight based on 100 lbs total flour in accordance with industry procedures.
**EXAMPLE I: REDUCED CALORIE WHITE ENRICHED BREAD**

<table>
<thead>
<tr>
<th>INGREDIENTS</th>
<th>Parts by Weight Based on 100 lbs Total Flour</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPONGE</strong></td>
<td></td>
</tr>
<tr>
<td>Wheat Flour, Patent</td>
<td>70.00</td>
</tr>
<tr>
<td>Wheat Gluten</td>
<td>2.00</td>
</tr>
<tr>
<td>Yeast</td>
<td>2.00</td>
</tr>
<tr>
<td>Yeast Food</td>
<td>0.50</td>
</tr>
<tr>
<td>Emplex (1)</td>
<td>0.50</td>
</tr>
<tr>
<td>Water</td>
<td>41.00</td>
</tr>
<tr>
<td>Enrichment &quot;M&quot; (2)</td>
<td>Three Tablets</td>
</tr>
<tr>
<td><strong>DOUGH</strong></td>
<td></td>
</tr>
<tr>
<td>Wheat Flour, Patent</td>
<td>30.00</td>
</tr>
<tr>
<td>Salt</td>
<td>3.00</td>
</tr>
<tr>
<td>Brown Sugar (6)</td>
<td>6.00</td>
</tr>
<tr>
<td>Soy Flour and Whey (3)</td>
<td>3.00</td>
</tr>
<tr>
<td>Wheat Gluten</td>
<td>8.00</td>
</tr>
<tr>
<td>Calcium Sulphate</td>
<td>1.25</td>
</tr>
<tr>
<td>Calcium Propionate</td>
<td>0.50</td>
</tr>
<tr>
<td>Selected Cellulose (4)</td>
<td>22.00</td>
</tr>
<tr>
<td>Yeast</td>
<td>1.50</td>
</tr>
<tr>
<td>Water</td>
<td>74.22</td>
</tr>
<tr>
<td>Flavour (5)</td>
<td>.09</td>
</tr>
</tbody>
</table>

(1) A dough conditioning additive produced by C.J. Paterson Co., Kansas City, Mo., and a registered trade mark.

(2) A vitamin and mineral enrichment, identified as No. 335, by Paniplus, Kansas City, Mo.

(3) Marketed as Extram C by Paniplus, Kansas City, Mo.

(4) Selected Cellulose:

(a) Cellulose BH200, the International Filler Corporation, No. Tonawanda, New York, having the following
characteristics:

Grade: BH200

Raw Material: Bleached Sulphite Woodpulp (Hardwood)

Chemical Properties:
- Alpha Content: 89.0%
- 10% KOH Sol.: 17.0%
- Ether Extract: 0.24%
- G.E. Brightness: 94.0%

Physical Properties:
- Moisture: 5-7%
- Bulk Density: 135 ML/50 Gram

Typical Screen Analysis: % on % through
- 100 mesh: 2.5
- 200 mesh: 10.0 86.0

(b) Also found acceptable in the Example and with similar characteristics was Cellulose BW-200 produced by Brown Company/Berlin-Gorham Division, Berlin, N.H.

(5) Firmenich Flavour, Type F-5109/TP, Firmenich Inc., New York, NY
(6) Golden Brown 10, Amstar Corporation, New York, N.Y.

PROCEDURE: The reduced calorie white enriched bread was prepared according to the following procedure:

Mix sponge four (4) minutes (high speed) in Day Horizontal mixer. Set sponge at 76°F. Ferment for 3 1/2 hours.
Mix dough 12 minutes (high speed) in Day Horizontal mixer. (To full development, dry and extensible dough).
Hold out the salt until pick-up. (5 minutes).
Dough temperature 80°F after mixing.
Dough fermentation time 20 minutes.
Scaling weight 18-3/4 ounces.
Intermediate Proof 10 minutes.
Shape and place in pan 8 1/2 x 4 1/2 x 3 1/4 inches, and proof to 3/4" above pan. Bake 18 minutes at 450°F. Cool and slic
RESULTS: The approximate 220 loaves which were produced from the example were analyzed and evaluated to confirm that the low calorie bread was similar in all respects to the standard white enriched bread including quality, specific volume, colour, grain and texture, crumb and taste. The differences, if any, from the standard white enriched bread were, for all intent and purposes, undetectable by the evaluators.

EXAMPLE II: The procedure for Example I was repeated with the selected cellulose content varying from 15 to 21 parts by weight of total flour. Adjustments were made in the water content to obtain the normal dough by procedures familiar to those skilled in the art. The resultant loaves were evaluated and it was determined that they did not meet the requirements of at least 25% reduction in caloric content, and it was not a satisfactory replacement in quality for the standard white enriched bread.

EXAMPLE III: The procedure for Example I was repeated with the selected cellulose content increasing from 22 up to 25 parts by weight of total flour with appropriate adjustments in the water content. The water content adjustments were made by procedures familiar to those skilled in the art to obtain the normal dough. The results obtained with the increased amount up to 25% were also acceptable and met the minimum requirements of 25% reduction of calories from the standard formula, and the bread had a satisfactory colour, grain, texture and eating quality.

EXAMPLE IV: The procedure for Example I was varied with the selected cellulose content increasing from 26 to 30 parts by weight of total flour with appropriate adjustments in water content to compensate for the increase in cellulose and to obtain the normal dough. The results were unsatisfactory and there was an adverse effect on the grain and texture of the bread and it did not
produce a loaf satisfactory in eating quality. With an increasing content of cellulose, the resultant product had less appeal than the standard white enriched bread due to many factors including poor slicing ability, a gummy texture and poor grain.

**EXAMPLE V:** The procedure for Example I was repeated with the brown sugar reduced 20% and the flavouring was varied 20%. The results were also found to be acceptable and met the minimum requirements.

The foregoing examples and evaluations indicate that a 25% reduced caloric content white enriched bread could be produced having equivalent taste, texture and appeal to the standard white enriched bread if a selected cellulose was critically controlled in relation to the total flour content and also if other adjustments were made to provide an equivalent tasting end product.

In order to substantiate our evaluation, and to demonstrate meaningful results and benefits gained by utilizing the low calorie white enriched bread, a clinical test was conducted with 16 college students. The students were divided into two groups, eight individuals in each group, all on a similar diet with the exception that one group ate 12 slices per day of standard white enriched bread, and the other group ate 12 slices per day of reduced calorie white enriched bread. The test was conducted for an eight week period with 13 students completing the test. Seven students completed the test in the standard white enriched bread group, and 6 students completed the test in the reduced calorie white enriched bread group. Each student in each group consumed the 12 slices per day in addition to the other food provided. Documentation was made for the weight reduction while the usual nutritional guide lines were adhered to. The composite person for the group eating the 12 slices per day of the standard formula...
white enriched bread lost 13.6 pounds or 1.7 pounds per week or approximately 32% of their excess weight. The composite person for the group consuming 12 slices per day of the reduced calorie white enriched bread lost 19.3 pounds or 2.4 pounds per week or a loss of 41% of the excess weight, this additional loss of weight being solely attributed to the difference in consumption of the reduced calorie bread in place of the white bread. In addition, it was indicated by those consuming the reduced calorie bread that it was in most, if not substantially all, factors the same and as acceptable to them as consuming the standard white enriched bread to which they were generally accustomed.

It is anticipated for the future, in evaluating the reduced calorie formula bread, that substantial benefits may be obtainable by elderly persons who consume the reduced calorie bread, the benefits deriving mainly from the increased consumption of a cellulose which will provide the necessary roughage to contribute to the proper functioning of their digestive and elimination systems. This contribution will not be at the expense of reducing the nutritional value obtainable from the reduced calorie bread, nor will it sacrifice the taste, texture and eating quality to which most elderly people have long been accustomed in consuming the standard white enriched bread formulation. These evaluations in connection with this new reduced calorie formulated white enriched bread indicate that a significantly improved formulation has been achieved which substantially advances the value to the consumer without reducing the standard white enriched bread nutrition, appeal and eatability.

It should also be understood by those skilled in the art that while the specific baking examples referred to above are given according to the standard sponge dough procedure utilized
in the baking industry, with only slight modifications therefrom the baking results obtained are valid not only for this sponge dough method but also for the continuous mix, short time, no time, and straight dough methods.
The claims defining the invention are as follows:

1. A reduced calorie bread product comprising 22 to 25 parts by weight of a cellulose constituent per 100 parts by weight of wheat flour, wheat gluten added as a protein supplement, brown sugar in a reduced quantity compared with the sugar content of standard white enriched bread, and without lard.

2. A bread product as claimed in claim 1 comprising approximately six parts by weight of brown sugar.

3. A composition for preparing a reduced calorie yeast-raised white bread product, comprising in combination based on 100 parts by weight of wheat flour: approximately 10 parts by weight of wheat gluten; 6 parts by weight of brown sugar; and 22 parts by weight of a selected cellulose.

4. A composition as claimed in claim 3 including approximately 0.1 parts by weight of a flavouring.

5. A reduced calorie white bread composition, the dry mix ingredients in parts by weight based on total flour comprising: 160 parts by weight wheat flour; 22 parts by weight of a selected cellulose; and approximately 10 parts by weight of wheat gluten; 3.5 parts by weight of yeast, with 0.5 parts by weight yeast foods, 3 parts by weight salt; 6 parts by weight brown sugar; 3 parts by weight of a combination of whey and soy flour.

6. A method of making a reduced calorie yeast-leavened baked product from wheat flour, comprising the step of adding to the dough formulation 22-25 parts by weight of a selected cellulose based on 100 parts by weight of the total flour content, with wheat gluten as a protein supplement and a reduced quantity of brown sugar compared with standard white enriched bread.

7. A method as claimed in claim 6 comprising the step of adding to the dough formulation 3-6 parts by weight of brown sugar.

8. A method of producing a reduced calorie white bread comprising the steps of: preparing a sponge of wheat flour, wheat gluten, yeast and yeast food, and water; and forming a dough from the sponge by adding wheat flour, salt, brown sugar, whey and soy flour, wheat gluten, yeast, water, adding 22 to 25 parts by weight based on total flour of a selected cellulose, and adding a flavouring to the dough.

9. A method as claimed in claim 8, including incorporating into the sponge and dough vitamin and mineral additives.

10. A bread product substantially as herein disclosed with reference to Example I, Example III or Example V.

Dated this Twenty-Seventh Day of April, 1979

ITT INDUSTRIES, INC.