Convention Application for a Patent

We
AMFAC FOODS, INC.
of
6600 S.W. Hampton Street, Portland, Oregon, United States of America

hereby apply for the grant of a Patent for an invention entitled

"POTATO SEGMENT AND PROCESS FOR PREPARING FROZEN FRENCH FRIED POTATOES SUITABLE FOR MICROWAVE REHEATING"

which is described in the accompanying complete specification.
This application is a Convention Application and is based on the application numbered 960,166

for a patent or similar protection made in United States of America

on 13th November, 1978

Our address for service is:

Care: SPRUSON & FERGUSON
PATENT ATTORNEYS
ESSO HOUSE, 127 KENT STREET
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AUSTRALIA.

Dated this SIXTH day of MARCH, 1979

AMFAC FOODS, INC.

By: [Signature]
Registered Patent Attorney

To: The Commissioner of Patents
COMMONWEALTH OF AUSTRALIA

DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT OR PATENT OF ADDITION

In support of the Convention Application made for a patent for an invention entitled
"POTATO SEGMENT AND PROCESS FOR PREPARING FROZEN FRENCH FRIED POTATOES SUITABLE FOR MICROWAVE REHEATING"

I, JOHN K. GEIST
of 5 Churchill Downs, Lake Oswego, Oregon, U. S. A.
do solemnly and sincerely declare as follows:

1. I am the applicant for the patent of addition (or, in the case of an application by a body corporate)
   authorized by AMFAC FOODS, INC. to make this declaration on its behalf.

2. The basic application as defined by Section 141 of the Act was made in United States of America on the 13th day of November, 1978 by FRANCIS R. SAUNDERS and RICHARD L. McLAUGHLIN

3. I am the actual inventor of the invention referred to in the basic application (or where a person other than the inventor is the applicant)
   FRANCIS R. SAUNDERS of 2755 S.W. Glen Haven Road, Lake Oswego, Oregon, United States of America, and
   RICHARD L. McLAUGHLIN of 2545 S.W. Anthony Drive, Aloha, Oregon, United States of America

are the actual inventors of the invention and the facts upon which the applicant is entitled to make the application are as follows:

The said applicant is the assignee of the actual Inventors.

4. The basic application referred to in paragraph 2 of this Declaration was the first application made in a Convention country in respect of the invention the subject of the application.

Declared at Portland, this 29th day of March 19 79

Signature of Declarant
John K. Geist

To:
The Commissioner of Patents,
 claim

1. A raw potato segment comprising: an

**elongate** body cut from a potato, said body having a
generally rectangular cross section, and first and second
pairs of generally opposing side surfaces, each having an
alternating sequence of laterally extending, rounded hills
and valleys of substantially uniform dimensions, each of
said hills having a top and each of said valleys having a
bottom, each hill of one side surface of said first pair
opposing a corresponding valley of the other side surface
of said first pair, each hill of one side surface of said
second pair opposing a corresponding hill of the other side
surface of said second pair, the distance between the top
of a hill of one side surface of said first pair and the
bottom of its corresponding opposing valley of the other
side surface of said first pair being about one-quarter
inch, and the distance between the top of a hill of one side surface of said second pair and the top of its corresponding opposing hill of the other side surface of said second pair being about one-half inch.
"POTATO SEGMENT AND PROCESS FOR PREPARING FROZEN FRENCH FRIED POTATOES SUITABLE FOR MICROWAVE REHEATING"

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

[Detailed description of the invention follows here]
POTATO SEGMENT AND PROCESS FOR PREPARING FROZEN FRENCH FRIED POTATOES SUITABLE FOR MICROWAVE REHEATING

ABSTRACT

A potato segment and a process for preparing frozen french fried potatoes suitable for microwave reheating. The potato segment has an undulating side surface configuration of particular dimensions which is adapted for microwave reheating. Potato segments are blanched, fried, and then frozen. When reheated with microwave energy, the potato segments resemble in quality, color, texture, flavor and odor, french fried potatoes prepared directly from fresh potatoes.
The present invention relates generally to the preparation of french fried potatoes, and more particularly to a potato segment and process for preparing frozen french fried potatoes suitable for microwave reheating.

The use of partially fried, frozen potato segments suitable for finish frying into french fried potatoes is steadily increasing since the process is economical and efficient and permits the retailer to market a relatively standard product. United States patents No. 3,397,993 and No. 3,649,305 disclose processes for preparing frozen potato segments which when finish fried resemble french fried potatoes prepared directly from fresh potatoes.

The widespread use of microwave ovens in homes, restaurants and vending machine facilities has enabled individuals to prepare hot food quickly and easily. However, heretofore potato segments which have been reheated in a microwave oven have been too greasy, soggy, dry or tough, etc. to be palatable. This is due to the difference in cooking action achieved by the use of deep frying or regular oven heating versus microwave oven heating. With the former, the potato segments are subjected to surface heating. With the latter, the potato segments are heated internally and moisture migrates from their interiors to their surfaces. This moisture must dissipate from the surfaces of the potato segments in the proper manner and amount for the resulting french fried potatoes to have a good texture. Good texture is represented by a well-cooked, mealy interior with a crisp, rigid exterior which is not tough or soggy. Neither limp, oil-soaked potato segments nor
those showing hard cores are representative of good texture.

Potato segment configurations heretofore known are not suitable for microwave cooking or reheating. They include the standard strip cut, the V-shaped or saw tooth cut, and various cuts having undulating side surfaces. A regular crinkle cut potato segment has undulating side surfaces. The side surfaces of each opposing pair are generally parallel. In its uncooked state, the amplitude of its undulations is approximately one-sixteenth inch. Its cross section is one-quarter inch square. United States Patent No. 3,643,721 discloses another potato segment having undulating side surfaces. In its uncooked state, the amplitude of its undulations equals or exceeds one-eighth inch. The side surfaces of one opposing pair are parallel, while the side surfaces of the other opposing pair are aligned so that the hills on one side surface oppose corresponding hills of the other side surface. In its uncooked state, the distance between opposing hill tops and valley bottoms of the opposing side surfaces of one opposing pair is one-half inch and the distance between opposing hill tops of the opposing side surfaces of the other opposing pair is one-half inch.

The present invention provides a potato segment and a process for preparing frozen french fried potatoes suitable for microwave reheating. The potato segment has a generally rectangular cross section and first and second pairs of undulating opposing side surfaces. The amplitude of the undulations is about one-eighth inch. The side surfaces of the first opposing pair are parallel while the
side surfaces of the second opposing pair are aligned so that the respective hills oppose each other. When the potato segment is in its uncooked state, the hill top to valley bottom distance between the side surfaces of the first pair is one-quarter inch, and the hill top to hill top distance between the side surfaces of the second pair is one-half inch. The potato segment has an average of ten undulations per three inches of length in its uncooked state.

Potato segments with the above configuration and dimensions are blanched, fried and then frozen. When reheated with microwave energy, the potato segments resemble in quality, color, texture, flavor and odor, french fried potatoes prepared directly from fresh potatoes.

In the drawings:

Fig. 1 shows an enlarged isometric view of a first embodiment of the potato segment of the present invention.

Fig. 2 is an elevational view of the potato segment of Fig. 1 taken along line 2-2 of Fig. 1 and drawn to a smaller scale.

Fig. 3 is an elevational view of the potato segment of Fig. 1 taken on line 3-3 of Fig. 1 and drawn to a smaller scale.

Fig. 4 shows an enlarged isometric view of a second embodiment of the potato segment of the present invention.

Fig. 5 shows an elevational view of the potato segment of Fig. 4 taken along line 5-5 of Fig. 4 and drawn to a smaller scale.

Fig. 6 shows an elevational view of the potato
segment of Fig. 4 taken along line 6-6 of Fig. 4 and drawn to a smaller scale.

In accordance with the present invention, potatoes are held in storage under conventional, accepted conditions, so as not to accumulate excessive amounts of sugar therein. Potatoes of the Russet Burbank variety which meet a seasonal average of twenty-one percent raw solids (specific gravity of 1.061) are preferred. The potatoes are cleaned and peeled, using abrasion, steam, lye, or some other technique well known in the art. Preferably caustic soda (sodium hydroxide) is used to peel the potatoes.

After being peeled, the potatoes are inspected and trimmed of any defects, and then cut into individual potato segments. The potato segments may be cut using a URSCHELL GRL cutter fitted with CONCERTINA blades set to cut the potato segments to the configuration and dimensions hereinafter described in greater detail.

Referring to Figs. 1-3, a first embodiment of the potato segment of the present invention comprises an elongate body 10 having a generally rectangular cross section, a first pair of generally opposing undulating side surfaces 12 and 14, and a second pair of generally opposing undulating side surfaces 16 and 18. Each of these side surfaces 12, 14, 16 and 18 has an alternating sequence of laterally extending, rounded hills 20, 22, 24 and 26, respectively, and valleys 28, 30, 32 and 34, respectively, of uniform dimensions. The amplitude of the undulations, e.g., the relative height difference between the tops of the hills and the bottoms of the valleys on the same side surface is about one-eighth inch.
Referring to Fig. 2, the side surfaces 12 and 14 of the first opposing pair are parallel, that is, the hills 20 of side surface 12 oppose corresponding valleys 30 of the side surface 14. Referring to Fig. 3, the side surfaces 16 and 18 of the second opposing pair are aligned so that the hills 24 of the side surface 16 oppose corresponding hills 26 of the side surface 18. As shown in Figs. 1-3, the first pair of opposing side surfaces 12 and 14 are longitudinally aligned with respect to the second pair of opposing side surfaces 16 and 18 so that the hill tops and valley bottoms of adjacent side surfaces coincide.

When the potato segment is in its raw or uncooked state, the hill top to valley bottom distance between the side surfaces 12 and 14 is one-quarter inch, and the hill top to hill top distance between the side surfaces 16 and 18 is one-half inch. To facilitate packaging, the elongate body 10 preferably has a length no greater than three inches. Thus, the overall dimensions of the potato segment are three inches by three-eighths inch by one-half inch. The potato segment has an average of ten hills or undulations for three inches of length in its uncooked state.

Figs. 4-6 depict a second embodiment of the potato segment of the present invention which is similar in all respects (including dimensions) to the first embodiment except that the first pair of opposing side surfaces 40 and 42 is longitudinally offset with respect to the second pair of opposing side surfaces 44 and 46 by three-sixteenths inch when the potato segment is raw. The amount of offset can be varied if desired. This potato segment presents the appearance of having its hills and
valleys running substantially continuously therearound. The aesthetic appeal of the potato segment is thus greatly enhanced.

The potato segments of the first and second embodiments are identically precessed. They are inspected for internal defects, such as hollow hearts. Slivers and short pieces are removed, using shuffaloes and shakers. The potato segments are sprayed with fresh water to wash off free external starch.

The potato segments are steam or hot water blanched to gelatinize the starch granules in the potato cells in the shortest time possible so as not to leach the potato flavor. If the concentration of reducing sugars is too high, the blanch time can be extended. The blanching is done for about forty-five seconds to about five minutes at a temperature of from about 160°F to about 212°F. Preferably the potato segments are blanched for two minutes at a temperature of about 170°F.

During the blanching, or immediately afterwards, additives may be incorporated into the potato segments. Modified food starch may be used as needed to increase the crispness of the finished fries, and sodium acid pyrophosphate (SAPP), a chelating agent, may be used to prevent the strips from becoming grey. Preferably the concentration of SAPP in solution should not exceed one percent. Dextrose (corn sugar) may be used to effect a golden color upon frying. Preferably no artificial coloring or flavoring agents are incorporated into the potato segments.

Next, the potato segments are fried for a time
sufficient to remove moisture and develop the texture
required of the finished product. The frying time will
vary depending upon the solids content of the raw potatoes.
In accordance with the invention the segments are fried
sufficiently long so that their oil solids content after
frying is from about sixteen percent to about twenty
percent by weight. After frying the percentage of oil
solids in the fried potato segments may have to be reduced
below this range in order to prevent the potato segments
from sticking together when reheated with microwave
energy. This may be accomplished by freezing the fried
potato segments in liquid Freon which will cause some of
the oil to be extracted. However, it is preferable that
the oil solids content be at least ten percent after
extraction.

The percentage of oil solids in the frozen potato
segments of the present invention differs considerably
from that of commercially available potato segments
adapted for finish frying. The latter are partially
fried initially so that in their frozen state their oil
solids content is from about three and one-half percent to
about eight and one-half percent by weight, and after
finish frying it is from about twelve percent to about
eighteen percent by weight, depending on the size of the
cut.

In any case, the potato segments of the
present invention are fried for a time sufficient to
completely cook them. Soybean, cottonseed, palm, or
combinations of these oils may be used for frying. The
potato segments of the present invention are preferably
fried by immersing them in a bath of refined beef tallow oleo stock or a blend of beef tallow and vegetable oil for about two to five minutes at a temperature of from about 340° F. to about 370° F.

The fried potato segments are blast frozen to an internal temperature preferably not above 0° F. They may be frozen by immersing them in liquid Freon. Slivers and short pieces are screened out and a final inspection is made prior to packaging. The packaged potato segments are stored and shipped at a temperature of about 0° F. or below.

The processing of the potato segments should be controlled so that after freezing the potato segments have a total solids content (including oil solids and potato solids) of from about fifty-six percent to about sixty-four percent, and preferably of from about fifty-eight percent to about sixty-two percent by weight. This can be accomplished by varying the frying time and temperature. By controlling the solids content of the frozen potato segments in this manner, the finished, reheated potato segments will have the desired texture and will not be unduly greasy or soggy.

When the consumer, such as an individual purchasing a package of the frozen potato segments from a vending machine, is ready to use the potato segments, he need merely place the package inside a microwave oven for a short time, e.g. one minute at 1,000 watts. The potato segments which are completely cooked during the frying step, are reheated in the microwave oven to serving temperature. Alternatively, the potato segments may be
reheated in a conventional oven for about six to seven minutes at about 400 \(^\circ\) F. to 425 \(^\circ\) F. or deep fried from the frozen state a second time for about thirty seconds.

The undulations on the side surfaces of the potato segments permit the hill tops to be fried crisp. During microwave reheating, the large surface area of the potato segments permits rapid loss of moisture. About one minute after the potato segments have been taken out of the microwave oven and removed from the package, a sufficient amount of moisture has dissipated from the hill tops so that they are crisp, while a sufficient amount of moisture has been retained in the remainder of the potato segments so that their interiors are mealy. The resulting french fried potatoes have an acceptable texture. After microwave reheating, the potato segments have an average of eight hills for every two inches of length. It has been found that the previously described potato segments, when processed as described, resemble in quality, color, texture, flavor and odor, french fried potatoes prepared directly from fresh potatoes.

**Example 1**

A quantity of Russet Durbank potatoes having a specific gravity of 1.078 was cleaned, peeled, trimmed of defects and cut into potato segments of the second embodiment. The potato segments were blanched for two minutes at a temperature of 170 \(^\circ\) F. SAPP was added to prevent discoloration and dextrose was added to effect a golden color upon frying. The potato segments were fried in an oil bath for four minutes at 350 \(^\circ\) F. Thereafter, the potato segments were blast frozen to an internal
temperature of $0^\circ$ F. and stored. After five months, two-ounce samples were reheated in a microwave oven for one minute at 1,000 watts. The finished product was excellent overall, resembling in quality, color, texture, flavor and odor, french fried potatoes prepared directly from fresh potatoes.

Example 2

A quantity of Russet Durbank potatoes having a specific gravity of 1.079 was cleaned, peeled, trimmed of defects and cut into potato segments of the second embodiment. The potato segments were blanched for two minutes at $170^\circ$ F. SAPP was added to prevent discoloration and dextrose was added to effect a golden color upon frying. The potato segments were fried in an oil bath for four minutes and fifteen seconds at $360^\circ$ F. Thereafter, the potato segments were blast frozen to an internal temperature of $0^\circ$ F. and stored. After two months, two-ounce samples were reheated in a microwave oven for one minute at 1,000 watts. The finished product was good, although not as good as that of Example 1.

Example 3

A quantity of Russet Burbank potatoes having a specific gravity of 1.078 was cleaned, peeled, trimmed of defects and cut into potato segments of the second embodiment. The potato segments were blanched for two minutes at $170^\circ$ F. SAPP was added to prevent discoloration and dextrose was added to effect a golden color upon frying. The potato segments were fried in an oil bath for four minutes at $350^\circ$ F. Thereafter, the potato segments were blast frozen to an internal temperature of $0^\circ$ F. and stored.
After five days, two-ounce samples were reheated in a microwave oven for one minute at 1,000 watts. The finished product was good, although not as good as that of Example 1.

Example 4

A quantity of Hermiston Russet potatoes having a specific gravity of 1.078 was cleaned, peeled, trimmed of defects and cut into potato segments of the first embodiment. The potato segments were blanched for two minutes at a temperature of 170°F. SAPP was added to prevent discoloration and dextrose was added to effect a golden color upon frying. The potato segments were fried in an oil bath for four minutes at 350°F. Thereafter, the potato segments were blast-frozen. Two-ounce samples were reheated in a microwave oven for one minute at 1,000 watts. The finished product was equivalent to that of Example 1.

A number of tests were run to determine the optimum configuration and dimensions for a potato segment intended to be reheated from a frozen state in a microwave oven. Commercially available, frozen, prefried potato segments were experimented with including the five-sixteenths inch square straight cut, the five-sixteenths inch square regular crinkle cut, the one-half inch square regular crinkle cut, the three-sixteenths inch square straight cut, the one-quarter inch square saw tooth cut, and the one-quarter inch square regular crinkle cut. Potato segments like those disclosed in United States Patent No. 3,643,721, having a one-half inch square cross section were also tried. Quantities of these different types of potato segments were blanched and fried for various time
periods at various temperatures and then frozen. When reheated in a microwave oven, none of the finished products was satisfactory primarily because of soggy texture. The product prepared in accordance with the present invention was superior overall.

Having described preferred embodiments of the invention, it will be apparent that the invention permits of modification in arrangement and detail.
The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

The claims defining the invention are as follows:

1. A raw potato segment comprising: an elongate body cut from a potato, said body having a generally rectangular cross section, and first and second pairs of generally opposing side surfaces, each having an alternating sequence of laterally extending, rounded hills and valleys of substantially uniform dimensions, each of said hills having a top and each of said valleys having a bottom, each hill of one side surface of said first pair opposing a corresponding valley of the other side surface of said first pair, each hill of one side surface of said second pair opposing a corresponding hill of the other side surface of said second pair, the distance between the top of a hill of one side surface of said first pair and the bottom of its corresponding opposing valley of the other side surface of said first pair being about one-quarter inch, and the distance between the top of a hill of one side surface of said second pair and the top of its corresponding opposing hill of the other side surface of said second pair being about one-half inch.

2. A potato segment according to claim 1 wherein the relative difference in height between the tops of the hills and the bottoms of the valleys on the same side surface is about one-eighth inch.

3. A potato segment according to claim 1 wherein the frequency of said hills is about ten per three inches of length.
4. A potato segment according to claim 1 wherein said segment has been blanched, then fried in an oil bath, and then frozen.

5. A potato segment according to claim 4 wherein said segment has been blanched for about forty-five seconds to about five minutes at a temperature of from about 160°F to about 212°F.

6. A potato segment according to claim 4 wherein said segment has been blanched for about two minutes at a temperature of about 170°F.

7. A potato segment according to claim 6 wherein said segment has been fried by immersing said segment for about two to five minutes in an oil bath at a temperature of from about 340°F to about 370°F.

8. A potato segment according to claim 7 wherein said segment has been frozen by cooling said segment to a temperature of 0°F or below.

9. A potato segment according to claim 8 wherein after said segment has been frozen, said segment has been reheated with microwave energy so that said segment resembles in quality, color, texture, flavor and odor, french fried potatoes prepared directly from fresh potatoes.

10. A potato segment according to claim 4 wherein the total solids content of said segment is of from about fifty-six percent to about sixty-four percent solids by weight.
11. A potato segment according to claim 4 wherein the total solids content of said segment is of from about fifty-eight percent to about sixty-two percent solids by weight.

12. A potato segment according to claim 4 wherein the oil-solids content of said segment is of from about sixteen percent to about twenty percent by weight.

13. In a process for preparing frozen french fried potatoes suitable for reheating with microwave energy wherein the potatoes are first peeled and trimmed, the steps comprising: cutting the potatoes into segments, each in the form of an elongate body having a generally rectangular cross section and first and second pairs of generally opposing side surfaces, each side surface having an alternating sequence of laterally extending, rounded hills and valleys of substantially uniform dimensions, each of said hills having a top and each of said valleys having a bottom, each hill of one side surface of said first pair opposing a corresponding valley of the other side surface of said first pair, each hill of one side surface of said second pair opposing a corresponding hill of the other side surface of said second pair, the distance between the top of a hill of one side surface of said first pair and the bottom of its corresponding opposing valley of the other side surface of said first pair being one-quarter inch, and the distance between the top of a hill of one side surface of said second pair and the top of its corresponding opposing hill of the other side surface of said second pair being one-half inch,
blanching said potato segments, frying said potato segments, and freezing said potato segments, whereby said potato segments, when reheated with microwave energy resemble in quality, color, texture, flavor, and odor, french fried potatoes prepared directly from fresh potatoes.

14. The process of claim 13 and further comprising the step of reheating the frozen potato segments with microwave energy.

15. The process of claim 13 in which the potato segments are cut so that the frequency of said hills is about ten per three inches of length when the potato segments are raw.

16. The process of claim 13 and further comprising the step of incorporating into said segments during or immediately after blanching means to inhibit discoloration.

17. The process of claim 13 and further comprising the step of incorporating into said segments during or immediately after blanching a food starch to increase the crispness of said segments after they have been reheated in a microwave oven.

18. The process of claim 13 in which said potato segments are blanched for about forty-five seconds to about five minutes at a temperature of from about 160°F to about 212°F.
19. The process of claim 13 in which said potato segments are blanched for about two minutes at a temperature of about 170\degree F.

20. The process of claim 13 in which said potato segments are fried by immersing them for about two to five minutes in an oil bath at a temperature of from about 340\degree F. to about 370\degree F.

21. The process of claim 13 wherein said potato segments are fried so that the total solids content of said segments is of from about fifty-six percent to about sixty-four percent solids by weight.

22. The process of claim 13 wherein said potato segments are fried so that the total solids content of said segments is of from about fifty-eight percent to about sixty-two percent solids by weight.

23. The process of claim 13 wherein said potato segments are fried so that the oil solids content of said segments is of from about sixteen percent to about twenty percent by weight.

24. The process of claim 13 in which said potato segments are frozen by cooling said segments to a temperature of 0\degree F. or below.

DATED this SIXTH day of MARCH, 1979

AMFAC FOODS, INC.

Patent Attorneys for the Applicant
SPRUSON & FERGUSON