

IMPROVED BREAD PAN

2161066

The present invention relates to improvements in a bread pan used for the final proof and the baking in the manufacture of bread.

Bread is broadly divided by the baking method into two types: one is pan bread baked in a pan and the other is hearth bread baked directly on the hearth of an oven. Bread is also divided by the material into two types: the rich bread for which high-protein flour is used with various kinds of ingredients and the lean bread for which low-protein flour is used. A pan ordinarily used has a square bottom and is closed either at all sides except at top (the bread baked with this type of pan is called the open top bread) or at all sides (the bread baked with this type of pan is called the Pullman bread having a rectangular section).

Bread baked with such a conventional square-bottom pan has various shortcomings: air hole structure of the crumb is not uniform; it is relatively difficult to bake lightly; long time is required for baking because of poor transmission of heat; the crust formed is thick; caving is apt to occur during cooling after baking; hardening starts from the corners of bread as water evaporates after baking, promoting aging (such as change of starch

(N)

- 1 to β starch and water scattering) and impairing the value of the products.

An object of the present invention is to provide an improved bread pan which reduces or obviates the
5 abovesaid shortcomings.

In accordance with the present invention, there is provided a bread pan having sides, ends, a bottom, and a cover, said bottom being downwardly convex in cross section, said sides being straight, and said convex
10 bottom blending smoothly with said sides.

Other features and advantages of the present invention will become apparent from the following description taken with reference to the accompanying drawings; in which:

- 15 Fig. 1 is a partially cutaway perspective view of a first embodiment of the present invention;

Fig. 2 is a perspective view of the cover; and

Figs. 3 and 4 are vertical sectional views of second and third embodiments respectively.

- 20 The bread pan embodying the present invention has a bottom 1 which is downwardly convex in cross section. The bottom 1 should be smoothly curved. It may be formed by part of a single curve drawn according to a given rule such as a circle, ellipse, hyperboloid
25 or parabola, or by combining parts of two or more of these curves. The bottom must be downwardly convex over its entire extent. If there were any downwardly concave portion, a recess (or groove) would be formed in the crust of the baked
-

bread. Upon contraction due to cooling and water evaporation, stress tends to concentrate to such a portion, causing deformation and impairing appearance. Furthermore, when taking the bread out of the pan, the crust would
5 be apt not to peel off the pan because of the presence of such a recess.

The bread pan according to the present invention comprises a round bottom 1, straight sides 2 and ends
8. The sides should smoothly connect to the curved bottom
10 1 at a portion 3 with no grooves or recesses. This is because such grooves or recesses would hamper smooth expansion of the dough spread in the pan during the final proof so that the air hole structure at the connection
3 between the sides and the bottom would differ from
15 that at the adjacent portions. In order to achieve a smooth connection, the bottom 1 and the sides 2 should be integrally molded from a single plate rather than making them separately and securing them together e.g. by welding.

20 The larger the height of the bread is, the more susceptible to caving the bread is because it is affected by its own weight and contraction by cooling or drying. However, the depth of the bottom 1 and the height of the sides 2 are not limited specifically. They may be
25 decided according to the taste of the consumer.

(2)

The bread pan may be enclosed by outer plates 4 at least at sides for reinforcement and to prevent the pan from falling. The outer plates may be integral with ^a the bottom plate 5 either by welding them together or
5 by bending a single plate. The outer plates 4 and bottom plate 5 should be formed with air holes 6 for uniform temperature distribution during baking. However, the outer plates and bottom plate are not essential and the bread pan should not be enclosed for better heat dispersion
10 in the baking oven.

The bread pan according to the present invention should be covered with a cover 7 to limit the expansion of dough during the baking. The cover may be of any construction so long as it is easy to open and close
15 and it does not open easily for itself upon expansion of the dough. It may be of a slidable type as shown in Fig. 2 or a single swing type provided with a hinge and a latch.

The bread pan should preferably be made of a metal
20 having a good heat conduction and heat resistance, such as tin, iron, copper, stainless steel and aluminum.

The bread pan according to the present invention may be used singly or a plurality of the bread pans may be arranged in a common outer covering.

25 Due to the fact that the bread pan according to

(14)

-5-

the present invention has a round or curved bottom, the pressure applied to the bottom of the dough under the final proof is uniformly distributed, so that a uniform air hole structure can be obtained because the final proof is smoothly done. The dough is not pressed particularly at the corners in a complicated manner any more unlike in the conventional method. Further, the time required for the final proof is shortened.

Secondly, during the baking, the bread pan according to the present invention can transmit heat well to the dough because of a round bottom, so that the dough can be baked lightly and softly. Since the bread baked with this pan has less corners than the conventional one, it is very advantageous over the Pullman type bread of a rectangular section because aging starts from the corners, impairing the value as a product.

EXAMPLE 1

A bread pan made of tin as shown in Fig. 3 was used which had a width R of 146mm, a height d of the straight portions 2 of 44mm, a radius r of bottom 1 of 73mm and a length of 360mm. The standard blending ratio ordinarily used in the straight dough technique was used: namely, 100 parts of wheat flour, 2 parts of yeast, 0.2 part

of yeast food, 2 parts of salt, 5 parts of sugar, 4 parts of shortening and 63 parts of water were mixed well.

The dough was subjected to the first fermentation for about 180 minutes in the usual way. The fermented dough

5 weighing about 855 grams was evenly spread in the bread pan and the pan was covered with the slidable cover 7.

The dough was then subjected to the final proof at 38°C for 40 minutes. Thereafter, with the dough left in the

bread pan, it was baked for 30 minutes in a baking oven

10 adjusted to 230°C.

The bread pan was taken out of the oven and the white bread was taken out of the oven and put on a cooling table with its round side up. The bread surface was soft both at its sides and curved top. Although some

15 degree of contraction (5 x 3 x 4mm with respect to the height, width and length of the bread pan, respectively)

was observed due to the water evaporation and the contraction of air holes with temperature drop, the bread maintained its semi-circular cross-section with no appreciable defor-

20 mation. Not only the crumb had a uniform air hole structure but also the crust was thinner than in the conventional product. The bread was soft and highly elastic even

after cooling. After letting the bread to stand on a

cooling table with its round side up, there ^{were} ~~was~~ no wrinkles

25 formed in the lower part of the sides of the bread.

Therefore, the bread was much higher in value as a product than the conventional product.

As a result of the experiments, in order to obtain bread having the abovesaid desirable properties, it was found that the following equations should be satisfied.

$$\begin{aligned}d &= (0.1 \sim 0.8) \times r \\&= (0.05 \sim 0.4) \times R\end{aligned}$$

Also, since the depth D of the pan equals ~~to~~ (r + d),

$$\begin{aligned}D &= (1.1 \sim 1.8) \times r \\10 \quad &= (0.55 \sim 0.9) \times R\end{aligned}$$

EXAMPLE 2

As shown in Fig. 4, a bread pan made of tin was used which has a width W of 120mm, a height d (of the portion 2) of 100mm, a length of 260mm and a bottom 1 formed by two small circles with a radius r₁ of 45mm and one large circle with a radius r₂ of 80mm. 910 grams of the dough (same as used in Example 1) was evenly spread in the bread pan and subjected to the final proof at 38°C with the cover 7 set in position. The time required for the final proof was about 37 minutes whereas it was about 50-55 minutes if the same dough was treated by use of a conventional square-bottom pan with the same filling density. After final proof, with the dough in

the pan, it was baked for 30 minutes in a baking oven adjusted to 230°C

As in the Example 1, the bread pan was taken out of the oven and the white bread was taken out of the pan and let to stand on a cooling table with its round side up. Because the height d was considerably larger than in the Example 1, caving was observed. But, the degree of caving was equal to or smaller than the conventional bread baked in a conventional Pullman or open-top pan.

10 Except that caving was observed, the bread obtained in Example 2 had substantially the same properties as the one obtained in Example 1, such as the air hole structure of the crumb, the conditions of crust, etc. The time required for the final proof was drastically shortened

15 and the air hole structure of the crumb after baking was uniform in quality. This indicates that fermentation and expansion are performed extremely smoothly and that the pan transmits heat well to the bread.

When the bread obtained by use of a conventional

25 Pullman type pan under the conditions in Example 2 was let to stand at room temperature for 24 hours, its corners hardened and the phenomena of aging started to appear. The bread made by use of the pan according to the present invention hardly showed such phenomena.



-9-

CLAIMS

- 1 1. A bread pan having sides, ends, a bottom, and a cover, said bottom being downwardly convex in cross section, said sides being straight, and said convex bottom blending smoothly with said sides.
 - 5 2. A bread pan as claimed in claim 1, wherein the depth D of the pan is equal to the sum of the height d of the straight sides and the radius r of curvature ~~of at least the side portions~~ of the convex bottom which blends with the straight sides, and wherein
10 $d = (0.1 \sim 0.8)r = (0.05 \sim 0.4)R$,
where R is the width of the pan.
 3. A bread pan as claimed in claim 2, wherein
 $D = (1.1 \sim 1.8)r = (0.55 \sim 0.9)R$.
 4. A bread pan as claimed in claim 1, 2 or 3,
15 further comprising an outer covering for preventing the pan from falling over.
 5. A bread pan substantially as hereinbefore described with reference to Figures 1 and 2, or Figure 3, or Figure 4 or the accompanying drawings.
-