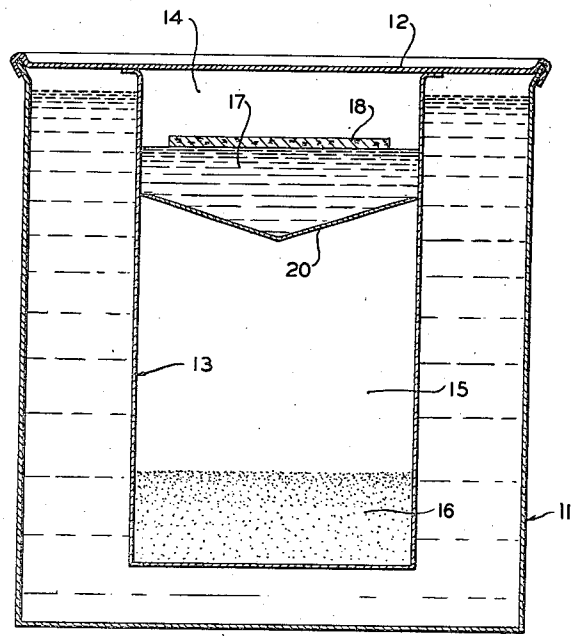
July 7, 1942. A. E. GESSLER 2,289,007

HEATING MIXTURE FOR FOOD CONTAINERS

Filed June 14, 1939



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Patented July 7, 1942 2,289,007

UNITED STATES PATENT OFFICE

2,289,007

HEATING MIXTURE FOR FOOD CONTAINERS

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Application June 14, 1939, Serial No. 279,002

3 Claims. (Cl. 252—70)

This invention relates to improvements in containers for foodstuffs, and has particular reference to that type of container which can be heated by means of a chemical reaction brought about between chemicals maintained in separate compartments in the container. Specifically, this invention relates to the use of a mixture of dry alkali metal monoxide and aluminum in such containers, and to a novel construction for such containers.

Many investigators have worked on the problem of producing a practical yet economical foodstuff container which would generate its own heat to a sufficient degree to heat the contents to the desired point, without the necessity for using a fire. Such foodstuff containers would have obvious advantages for use in hunting, camping and picnic trips, and in time of war. High cost, and the considerable increase in weight occasioned by the chemicals required have contributed to the failure of this idea heretofore; but the principal objection to the containers available has been their failure to react rapidly and completely when the reaction is under control at all, so that a great deal of heat is lost during the heating process.

I have discovered that a very rapid and controlled evolution of heat can be obtained in such cans by reacting water with a dry mixture of alkali metal monoxide, particularly sodium monoxide, and aluminum, in granular or powder form, and preferably diluted with an inert carrier; and that relatively small quantities of this reaction mixture will effectively warm up relatively large quantities of foodstuff in a short time.

The reaction proceeds in two stages. In the first stage, the sodium monoxide is converted to caustic soda almost instantaneously as the water drips on it, this reaction being accompanied by considerable evolution of heat, according to the equation, in gram mols—

$$2Na_2O+2H_2O=4NaOH+134 \text{ kg. calories.}$$

As this reaction is substantially instantaneous, the heat produced not only starts to warm the foodstuff in the container, but it also initiates the slow-starting reaction between the caustic soda, aluminum and water, which thereafter becomes violently exothermic. This reaction proceeds according to the following equation:

$$4NaOH+2Al+2H_2O \rightarrow 2NaAlO_2+3H_2+2NaOH+204 \text{ kg. calories}$$

Because of the fact that the reaction produces a considerable quantity of gas, I prefer to conduct the reaction in a special can shown in the accompanying drawing, which is a section through the can.

In the drawing, 11 is a cylindrical can of conventional design, provided with a top 12, to which is attached a smaller can body 13, separated by a plate 20 into a top compartment 14 and a bottom compartment 15. The plate is preferably a segment of an inverted cone, as shown in the drawing. A mixture of chemicals 16 is placed in the bottom compartment, and water 17 is placed in the top compartment. A cork float or rubber disk 18, covering most of the area of the compartment, is inserted into the water compartment.

In the operation of the device, a hole is punched through the top 12 of the can, the disk 18 and the plate 20. Water drips onto the chemical mixture 16, and the reaction commences with evolution of gas. The disk 18 covers the hole punched through the plate 20, and since it is movable, the gases which emerge through the holes lift it while simultaneously passing under and around the disk to reach the corresponding hole in the top plate 12. Because of this baffling action of the disk, the pressure in the upper compartment is equalized, and fitful escape of the gases is reduced.

The ratio of the volume of the can 13 to the can 11 is determined to a large extent by the amount of chemical mixture used, the available radiation area, and the time consumed by the reaction. I prefer to dilute my mixture of sodium monoxide and aluminum with an inert carrier, thus slackening down the reaction so it is complete in about ten minutes, and to use sufficient chemicals to be able to raise the food from 0° F. to 110° F., to provide for thorough warming of the food under even very adverse conditions. For a can holding a quart of food in the outer compartment, I find a mixture of 30 grams Na_2O, 20 grams aluminum powder and 20 grams of a diluent such as pumice, may be placed in the bottom compartment, and 50 grams of water placed in the top compartment. With a plain cylindrical shape such as is most economical to prepare, the inner can should occupy about ⅓ of the total volume. With such a mixture of chemicals in such a can, there is a heat evolution of 94.8 kg. calories and an actual rise in temperature obtained of 110° F. This represents an unusually high thermal efficiency of 50%, which I attribute to the instantaneous initiation and controlled speed of the reaction.

The diluent used in the chemical mixture may

be any inert powder or granular material; I may use pumice, infusorial earth, fuller's earth, or any other inert substance. This inert substance serves a two-fold purpose—it reduces the violence of the exothermic reaction, and it serves to absorb excess water which does not escape as steam, thus ensuring a dry, non-flowing spent reaction mass.

The aluminum and mono-sodium oxide are preferably powdered or granulated, since they react more easily in this condition. I may, however, use small aggregates of the oxide, and aluminum turnings, or other aluminum of high surface. In such case, the amount of diluent must be varied to insure proper rate of reaction.

The sodium monoxide may be replaced by other alkali-metal monoxides, such as potassium monoxide. The water used should preferably be mixed with alcohol or other freezing point depressant, to insure its flow in cold weather.

While I prefer to employ a can of the type shown herein, my improved results can be obtained in many cans of types used heretofore for similar purposes.

I claim:

1. A mixture for use in a self-heating food container having a compartment for food storage and a compartment containing chemicals to develop the heat required to heat the food, which comprises a mixture of dry alkali metal monoxide and aluminum metal.

2. A mixture for use in a self-heating food container having a compartment for food storage and a compartment containing chemicals to develop the heat required to heat the food, which comprises a mixture of dry sodium monoxide and aluminum metal.

3. A mixture for use in a self-heating food container having a compartment for food storage and a compartment containing chemicals to develop the heat required to heat the food, which comprises a mixture of dry sodium monoxide, inert extender, and aluminum metal.

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