

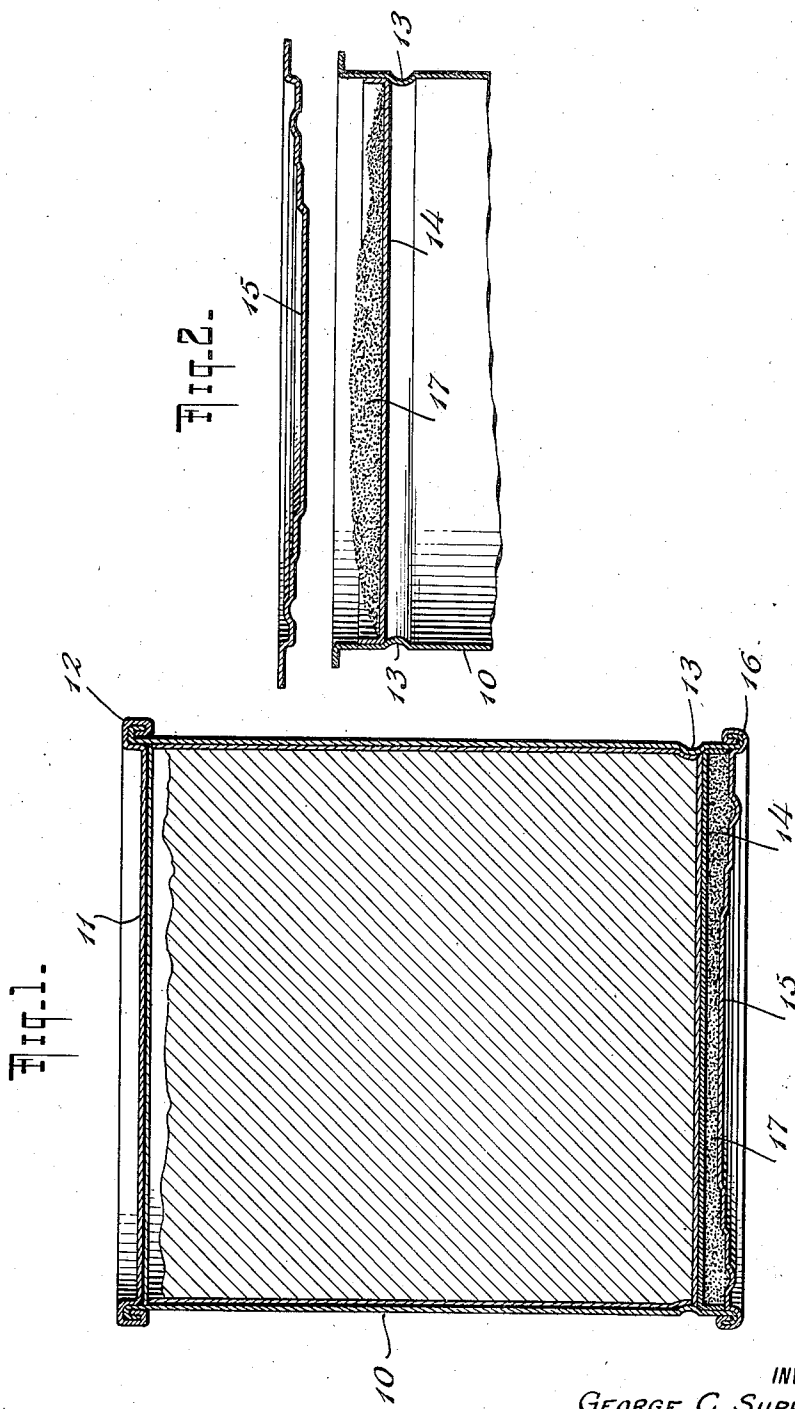
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G. C. SUPPLEE

METHOD OF PACKING FOOD PRODUCTS AND CONTAINER THEREFOR

Filed August 15, 1924 2 Sheets-Sheet 1



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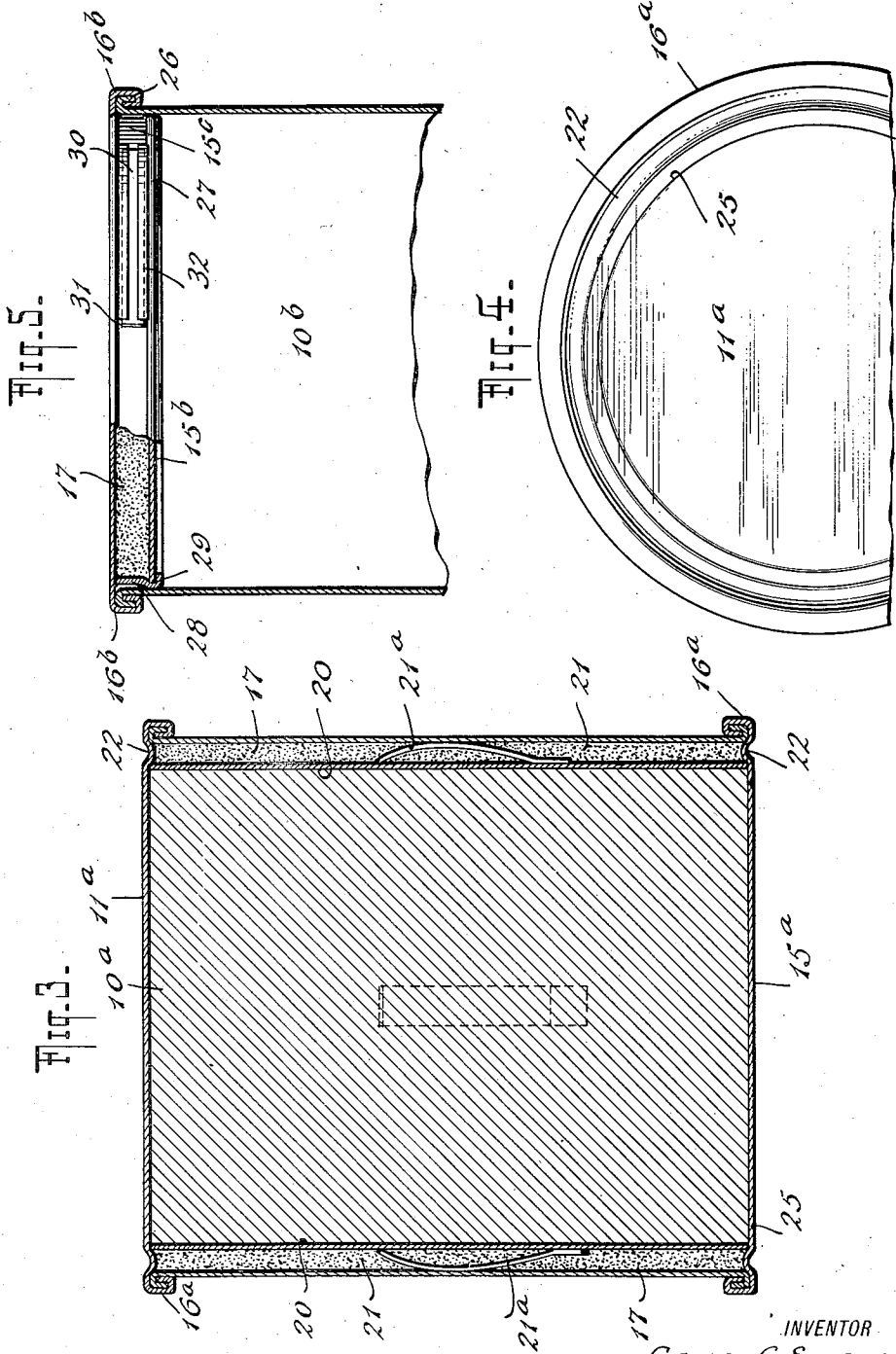
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UNITED STATES PATENT OFFICE.

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METHOD OF PACKING FOOD PRODUCTS AND CONTAINER THEREFOR.

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My invention relates to the packing of dry milk and other foods in such a manner as to preserve them for a long time. To accomplish this result, I have devised a novel method and a novel type of container in which reducing chemicals are employed to act on the oxygen of the air within the container, so as to prevent such oxygen from exerting a deteriorating influence on the food; at the same time, my invention insures permanent separation of said chemicals from the food, so that the latter may not be injured by direct contact with such chemicals.

Several examples of containers of the type invented by me are illustrated by the accompanying drawings, in which Fig. 1 is a central vertical section through a container embodying my invention; Fig. 2 is an inverted sectional detail showing the construction of the receptacle for the chemical; Fig. 3 is a central vertical section through a modified form of the container; Fig. 4 is a plan view partly broken away of the container shown in Fig. 3 and Fig. 5 is a central section of still another modified form of the container with parts of a receptacle being shown in side elevation and in section.

In Figs. 1 and 2, the numeral 10 indicates a container of any suitable construction, but which as shown is provided with a top or cover 11, which may be removable and, in the illustrated example, is securely locked to the container, for instance as indicated at 12. Adjacent to its bottom edge, the container is provided with an inwardly projecting shoulder or bead 13, against which a receptacle or tray 14 is adapted to be seated and held in place by the bottom 15 which is turned or rolled to form, with the main body portion of the container, the rolled seam 16. In the example illustrated, the container is shown as filled with a food product in a dried or powdered condition. The tray 11 is filled with the reducing reagent 17 which preferably consists of commercial ferrous sulphate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) freshly ground to a coarse powder and mixed with a suitable proportion of dry lime $\text{Ca}(\text{OH})_2$. The freshly ground ferrous sulphate is sufficiently moist to allow the starting of a chemical reaction between the sulphate and the lime whereby iron hydroxid $\text{Fe}(\text{OH})_2$ is formed. The iron hydroxid formed by this reaction is an intermediate product which on contact with the

air combines with the oxygen thereof to form ferric oxid or common iron rust (Fe_2O_3). As these reactions proceed upon a quantitative basis, the amounts of material required can be calculated with mathematical accuracy. For example, let it be assumed that the volume of air in the packed container equals 1000 c. c.; 209 c. c. of oxygen must be removed, leaving 791 c. c. of nitrogen and a partial vacuum according to the amount of oxygen absorbed. In case the outside air should leak into the can slowly during long storage periods, the oxygen of such incoming air could also be absorbed until equal pressure existed inside and outside the can. Under such a condition, the can becomes automatically filled with an atmosphere consisting almost exclusively of nitrogen, and no vacuum exists. Therefore, in order to provide sufficient iron sulphate to take up all the oxygen which might seep in, it is necessary to add more than the theoretical amount required to take up the oxygen originally in the can. Calculations show that in a can of this size, provision should be made to absorb 266 c. c. of oxygen. One gram of the iron sulphate completely changed through the hydroxid to iron oxid (iron rust) requires 0.02852 grams of oxygen. One liter of pure oxygen weighs 1.4292 grams, therefore 0.38038 grams of oxygen must be absorbed. This requires 13.2 grams of the iron sulphate. To convert this amount of sulphate into the easily oxidizable hydroxid, 3.52 grams of lime are required. Similar calculations may obviously be made for other sizes of containers from which the oxygen is to be taken up.

The iron sulphate either ground or unground may be kept for long periods without material deterioration. The success of the method involves getting the unoxidized hydroxid in the can and getting the can sealed before the material has been rendered inert and useless by taking up any considerable amount of oxygen. When the iron sulphate is mixed with the lime, the time elapsing before rapid absorption of oxygen takes place depends upon the rapidity of formation of the hydroxid, which in turn can be controlled by varying the amount of free moisture in the lime and in the iron sulphate. In my experimental work I have been able to extend this time to several minutes. Several hundred cans may be packed by this method where only one per-

son measures and mixes the lime and sulphate by hand, placing the mixture in small envelopes and the can in the automatic sealer, before any marked deterioration of the mixture results. When using the sulphate in excess of the amount required to take up all the oxygen from a filled can of powder, it has been found that only about 0.25% of oxygen remained in the can after four hours.

The manner in which the packing is effected is as follows:

The container 10 is filled with the food product, after which the tray 14 containing the freshly prepared material 17 is seated within the inverted container and the container is placed in an automatic sealing machine which secures the bottom 15 and forms the seam 16. The fit between the side walls of the tray and container is sufficiently neat to prevent the reducing material, which forms a porous dry cake after the reaction has progressed, from passing into the body of the container, while the fit not being air tight permits the circulation of the air from the body of the container to the reducing agent.

While the use of ferrous sulphate and lime hereinbefore described is preferred to accomplish the de-oxidation of the air in the container, my invention is not to be considered as limited to these substances as it will be apparent that many other substantially dry materials or mixtures may also be used without departing from the spirit of my invention. Among such other materials, the following examples may be noted: stannous chloride (SnCl_2) which in the presence of moisture will combine directly with the oxygen of the air forming stannic chloride (SnCl_4) basic chloride of tin ($\text{SnCl}(\text{OH})\text{Cl}$). The reaction takes place in a substantially dry atmosphere and the resultant products are substantially dry, the stannic chloride which results from the oxidation in the presence of small amounts of moisture, forming a series of crystalline hydrates. This latter phenomenon is of importance because of the formation of crystals sufficiently large to prevent their passage through the restricted space allowed for the passage of the air.

Certain cobaltous compounds in the presence of traces of moisture and a suitable basic substance are converted to cobaltous hydroxid which will combine directly with the oxygen of the air in a manner practically identical with the formation of iron hydroxid.

The properties of the chromous salts also permit of their use in place of the substances hereinbefore enumerated. When chromous chloride is mixed with substantially dry alkali, for example, lime, in the presence of traces of moisture, a readily oxidizable hy-

droxid is formed, the action of which is similar to that of the ferrous and cobaltous salts. Chromous chloride may also be used in the presence of an acid medium, for example, by impregnating with acid an inert material such as sawdust, infusorial earth, bone black or even dehydrated calcium sulphate.

Still another material which may be used is bright metallic copper which in the presence of ammonia gas combines directly with the oxygen of the air. A suitable dry ammonium salt such as ammonium chloride mixed with a dry base, for example, lime, may be used as the source of the ammonia gas and the copper, in the form of filings or chips, may be mixed with the ammonium chloride and lime.

The construction of the container shown in Figs. 1 and 2 may be varied. In Figs. 3 and 4, I have shown an example of a different form of container in which the reducing material is placed within a jacketed can 10^a having an inner jacket 20 arranged concentrically within the can and extending the full length thereof. The inner jacket 20 is spaced from the can to provide a compartment 21 in which the reducing material 17 is placed. Suitable spacing means such as the metal strips 21^a are preferably provided to hold the inner jacket concentrically of the outer can. In packing this container the food products are placed within the inner jacket, after which the material 17 is placed within the compartment 21. The top 11^a which is secured to the can forms the bottom thereof during the packing operation, after which the bottom 15^a is placed upon the can in the automatic sealer which forms the bead 16^a. Both the top 11^a and bottom 15^a are provided with a deep bead 22 which projects within the compartment 21 to prevent the oxygen absorbing materials from passing into the central compartment and also serves as an additional means to hold the inner jacket 20 in position. The top 11^a of the can is preferably scored along a circular line 25 located well within the inner jacket to facilitate the opening thereof, and to indicate the proper place for opening the container.

In the example shown in Fig. 5, the container 10^b is provided with a dished bottom 15^b which has a cup shaped tray 15^c secured thereto and is provided with an annular flange 26 which is adapted to be crimped in the automatic sealer to form the bead 16^b. The bottom 27 of the tray 15^c is secured to the side wall 28 thereof by a loosely crimped seam 29 which will permit the circulation of air, but will prevent the material 17 from passing through the seam. An opening 30 is provided in the side wall of the tray for the introduction of the oxygen absorbing material 17,

and a closure 31 slidable in suitable guides 32 is provided for closing said opening after the material 17 has been placed within the tray. Any suitable means may be provided to prevent accidental opening of the closure 31.

It will be noted that in each form of container illustrated, the restricted passage provided for the circulation of the air is tortuous so as to prevent the passage of particles of the chemicals from the chemical holding tray or compartment into the main body of the container. A common characteristic of the chemicals employed is that they are in the form of large crystals, or form a cake, so that no small, loose particles of the chemicals capable of passing through the air passages are present.

It is to be understood that the various examples of suitable chemicals hereinbefore enumerated are merely illustrative, as it will be obvious that many other chemicals could be employed. It will also be understood that my invention is not limited to the specific constructional details of the containers or compartments illustrated as the principles herein disclosed obviously may be utilized in a great variety of container constructions.

It will also be noted that my improved method enables me to meet the following requirements: First, the chemicals should not react with the food products to be packed; second, there should be no evolution of gas harmful to the food product as the result of the reaction with the oxygen; third, the chemical employed must be cheap, so that the added cost of the packing operation will not exceed a fractional part of a cent per container; fourth, the mechanical or physical aspects of the methods of using the chemical must be simple enough to enable an efficient packing operation to be performed in a short time; fifth, the time rate of the reaction must be susceptible of control so that the affinity which the chemical employed has for oxygen will not be exhausted before the packing and sealing of the cans is completed; sixth, the manner in which the chemical is used must be such that evidence of its use will not be recognized by the consumer; and lastly, the direct intermixture of the chemical or any particles thereof with the food products must be prevented, while permitting circulation of the air within the container to and through the chemical.

I claim:

1. The method of removing oxygen from containers for packing food products which consists in placing within the container a mixture of chemicals which will react to form as an intermediate product, a reducing agent capable of combining directly with the oxygen of the air, while preventing direct contact or admixture of said chemicals or reducing agent with the food products

contained in said container, and finally sealing said can before any substantial oxidation of said reducing agent occurs.

2. The method of removing oxygen from containers for packing food products, which consists in placing within the container a mixture of chemicals which, in the presence of moisture, will react to form, as an intermediate product, a reducing agent capable of combining directly with the oxygen of the air, while preventing direct contact or admixture of said chemicals or reducing agent with the food products contained in said container, and finally sealing said can before the affinity of said agent for oxygen is exhausted.

3. The method of packing food products in a container which consists in placing within the container, but out of contact with each other, the food product and a solid reducing agent free from small, loose particles, keeping the said agent and the food product separate while allowing the air which is in contact with the food product to pass into contact with said reducing agent, and sealing the container.

4. The method of packing food products in a container, which consists in placing within the container, but out of contact with each other, the food product and a body of ferrous sulphate and lime, keeping the particles of said body from contact with the food product, while allowing the air which is in contact with the food product, to pass into contact with said body, and finally sealing the container.

5. A sealed container having two compartments, one containing a food product and the other a substantially dry, solid reducing agent, and a barrier interposed between said compartments and forming with the walls of said container a restricted passageway which permits the passage of air from the food-containing compartment to the other compartment but prevents the passage of said agent to said food-containing compartment.

6. A sealed container having two compartments, one containing a food product and the other a reducing agent in the form of a solid substance free from minute loose particles, and a barrier interposed between said compartments and forming with the walls of said container a restricted passageway which permits the passageway of air from the food-containing compartment to the other compartment but prevents the passage of said agent to said food-containing compartment.

7. A sealed container having two compartments, one containing a food product and the other a reducing agent, consisting of a body of ferrous sulphate and lime, and a barrier interposed between said compartments and forming with the walls of said container a restricted passageway which per-

mits the passage of air from the food-containing compartment to the other compartment but prevents the passage of said agent to said food-containing compartment.

5 8. The combination with a container adapted to hold food products of a shallow, imperforate receptacle adapted to contain a chemical and a restricted passageway between said receptacle and container to permit circulation of a gaseous medium between
10 said receptacle and container while preventing the passage therebetween of particles of solid material.

9. In a container adapted to hold food
15 products, a receptacle adapted to contain a chemical and a restricted passageway of tortuous configuration between said receptacle and container to permit circulation of a gaseous medium between said receptacle and
20 container while preventing the passage of particles of solid material.

10. The combination with a sealed container adapted to contain food products and consisting of side and end walls, of a partition located in closely spaced relationship to one of said walls and substantially continuous therewith to form with said wall a shallow compartment, and a reducing agent in a solid substantially dry condition
30 packed within said compartment; the ends of said partition terminating sufficiently close to certain of the other walls of said container to provide a restricted passageway through which air is permitted to circulate
35 but which prevents the passage of particles of said reducing agent therethrough.

11. The combination with a sealed container, of a false bottom which forms with one of the walls of said container a shallow
40 compartment, and a reducing agent in the form of a substantially dry solid packed within said compartment; said false bottom further forming with said container a restricted passageway through which air
45 is permitted to circulate but which does not permit the passage of said reducing agent therethrough.

12. The combination with a sealed container, of a partition located in closely spaced

relationship to one of the walls of said container and forming therewith a shallow compartment, said container being provided with a bead to hold said partition against lateral movement, and a reducing agent in a solid, substantially dry condition
55 packed within said compartment.

13. A method of packing food products in a sealed container with a reducing agent capable of combining directly with the oxygen of the air within said container, characterized by preparing said reducing agent by mixing ferrous sulphate and lime in the presence of moisture whereby a mixture of iron hydroxid and calcium sulphate is formed, the iron hydroxid acting as the
65 reducing agent and the calcium sulphate as a cementitious binder to form said mixture into a coherent porous cake.

14. A method of packing food products in a container with a reducing agent capable
70 of combining directly with the oxygen of the air within said container and thereby prevent oxidation and deterioration of said food products, characterized by preparing a mixture of chemicals which will react in
75 the presence of moisture to form the reducing agent as an intermediate product, and governing the time rate of the reaction which forms such reducing agent by controlling the amount of moisture present so as to allow sufficient time for packing and sealing
80 said container before the completion of said reaction.

15. A method of packing substances susceptible to deterioration in the presence of
85 oxygen which consists in preparing a mixture of chemicals which will react to form a reducing agent as an intermediate product, placing such mixture and the substance to be packed within a container, while controlling the time rate of the reaction which
90 forms said reducing agent so as to allow sufficient time for packing and sealing said container before the completion of the reaction which forms said reducing agent. 95

In testimony whereof I have hereunto set my hand.

GEORGE C. SUPPLEE.