May 29, 1951 M. C. FOX ET AL 2,555,031

CONTAINER

Filed July 10, 1946

FIG. 1

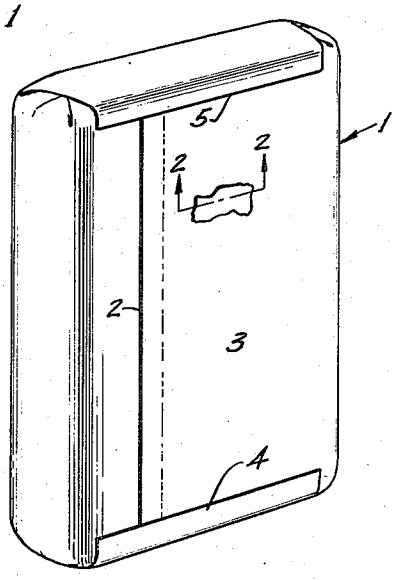


FIG. 2

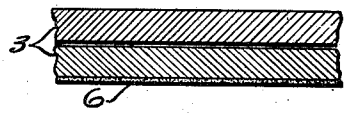
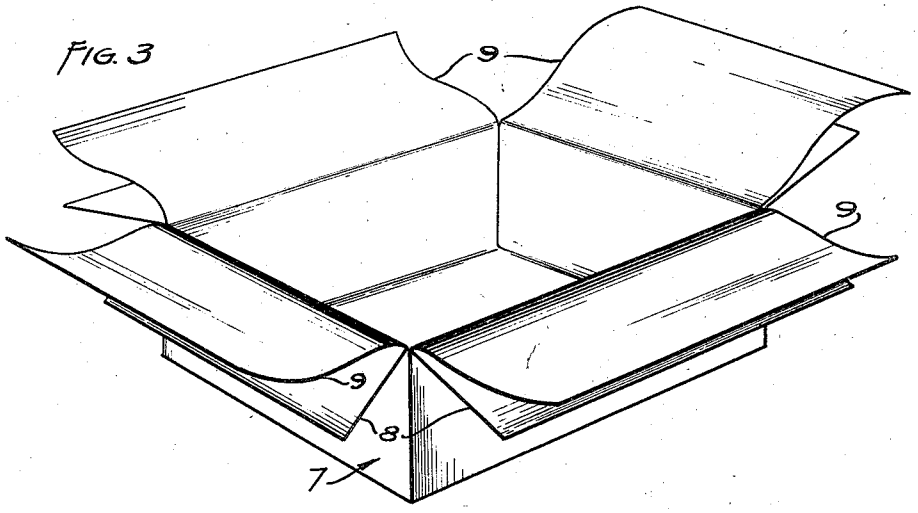


FIG. 3



INVENTORS
MARY C. FOX
CHARLES C. HOWES

BY

Semmes, Kregin, Beale and Semmes
ATTORNEYS

Patented May 29, 1951

2,555,031

UNITED STATES PATENT OFFICE

2,555,031

CONTAINER

Mary C. Fox and Charles C. Howes, Baltimore, Md., assignors to The Davison Chemical Corporation, Baltimore, Md.

Application July 10, 1946, Serial No. 682,527

2 Claims. (Cl. 206—2)

1

This invention relates to containers and more particularly to containers suitable for storing phosphatic fertilizers for extended periods.

Excessive failure of bags used for shipping superphosphate fertilizers has resulted in abnormal losses and waste of the fertilizer. This failure has been more noticeable when the bags are used for shipping granulated phosphates than was the case in shipping the pile cured phosphate.

In an attempt to overcome the bag loss the fertilizer industry has used a laminated bag in which the inner ply is asphalt treated kraft paper. This asphalt treated liner has increased the life of the bags but has not been entirely satisfactory. A very important objection to the laminated, asphalt coated bags is their high cost and lack of uniformity.

It is an object of this invention to provide a container for the shipping of superphosphate fertilizers.

Another object of this invention is to provide a satisfactory container which can be made at low cost.

Still another object of this invention is to provide a container which will resist the action of the chemicals in granulated superphosphate fertilizers.

A still further object of this invention is to provide a container which may be used for shipping the superphosphate fertilizers and which does not require that the composition of fertilizers be altered to protect the container.

With these and other objects in mind, which will become apparent in the following description, this invention resides in a container, the inner surface of which is coated with an alkaline material to neutralize the action of chemicals evolved from the material therein.

In the drawings:

Figure 1 is a perspective view of a paper bag employing the concept of this invention.

Figure 2 is a highly magnified cross sectional view taken on line 2—2 of Figure 1 depicting the location of the coating on the inner surface of the container.

Figure 3 is an elevational view of a carton employing the concept of this invention.

It is an established fact that the failure of bags in storing and shipping of superphosphate fertilizers is attributed to the causing of bag rot by volatile fluorine compounds.

In order to illustrate the preferred form in which this invention may be used, its application to kraft paper bags similar to those usually used

2

as containers for superphosphate fertilizers will be described. The bag 1 is usually made by joining the edges 2 of a sheet of paper 3 to form a tube-like structure and then folding and securing the paper at one end 4 to seal that end of the tube. This forms an ordinary bag-like structure which is open at one end for receiving the material to be shipped. After the filling of the bag, the top 5 is then closed in a manner similar to that used for the bottom. The edges of the sheet at the side and at both ends may be joined by any suitable means, such as sewing or gluing. This invention may be applied equally well to a bag formed from a single sheet of paper or from several sheets joined to form the container. The bag illustrated in Figures 1 and 2 is formed from two sheets but three, four, or more sheets can be employed depending on the strength desired.

The surface of the sheet of paper which will form the inner wall of the bag is coated with alkaline material 6, illustrated in Figure 2, which serves as a protective coating for the paper. The coating may be applied either before or after the construction of the bag. If the bag is several sheets thick, it is necessary that the inner surface of the inside sheet be coated. A coating made primarily of lime which is secured to the surface of the paper by an adhesive has been found to give excellent protection against the materials causing bag rot. A suitable coating using lime may be prepared by mixing 50 parts of commercial hydrated lime with 100 parts of water and 1 to 5 parts of starch. This mixture is then boiled for a few minutes and then allowed to cool. The slurry may then be applied to the paper with a brush and dried to give a relatively tough coat of lime completely covering the surface of the paper. The starch used in preparing the mixture merely serves as an adhesive which toughens the coating and also prevents it from flaking away from the paper. Since the starch serves only as an adhesive, it is, of course, apparent that other adhesives may be used in its place.

Tests of paper coated with lime as described above have shown excellent resistance to bag rot. Whereas uncoated bags in which granulated superphosphate fertilizers have been stored for three months lose as much as 80% of their bursting strength, the bags which have the inner sheet coated with lime showed no appreciable loss in strength. From a standpoint of economy, lime provides a most satisfactory alkaline material. The low equivalent weight of lime allows

a thin coat to react with large quantities of hydrofluoric acid.

The deterioration of paper bags due to bag rot can also be reduced by coating the inner surface of the bag with alkaline materials other than lime. For example, sodium silicate might be used, in which case it is not necessary to mix the coating material with an adhesive. Another coating material which has been used with beneficial effects is sodium carbonate. It is important in coating the inner surface of the container to apply sufficient alkaline material to maintain that surface in an alkaline condition throughout the period the container is to be used. In the selection of a coating material it is also desirable to select one which is not hygroscopic because of the serious weakening effects of water on the paper. One of the advantages of lime, in comparison with sodium carbonate, for example, is its lower cost and the greater facility with which an adequate coating may be applied to the paper. Lime can be applied as a slurry but the high solubility of sodium carbonate makes application in a coating sufficiently thick somewhat difficult.

Of course, it is not necessary that the container be a flexible bag as described above and as illustrated in Figure 1. A carton or box 7 similar to that illustrated in Figure 3 might also be employed. If the carton is to be used without a liner, the alkaline coating might be applied directly to the inner surface 8 of the container. If ordinary wall board or cardboard is used in the manufacture of the container, the alkaline coating will protect that material from any compounds evolved by the superphosphate which might cause weakening of the container. If a liner 9 is used with the box, it is not necessary to coat the inner surface of the box. The liner may be strips of paper of the proper width which have been coated on their inner surface and placed in the box to protect it from the superphosphate. The same factors which determine the choice of alkaline material for paper bags would, of course, apply in the choice of suitable coating materials for the cartons.

It is apparent that this invention provides an inexpensive means for protecting the containers ordinarily used in the handling of superphosphate fertilizers from deterioration by the compounds in the fertilizer. This means of protection greatly increases the useful life of the container and has been found to be of greatest value in containers for shipping granulated superphosphates to foreign countries, wherein there is an extended period between the time of packing and use of the fertilizer and may be employed without materially increasing the cost of the containers. By the use of the concept of this invention, it is possible to eliminate much of the loss of fertilizer occasioned by the breaking of the containers during shipping, and consequently, important savings to the manufacturer and the consumer are made possible.

By protecting the bag from the materials causing the bag rot, neutralizing of the superphosphates is made unnecessary. It is thus possible to handle economically a superphosphate fertilizer with a composition governed only by the requirements of a satisfactory fertilizer. A bag protected in the manner described maintains its strength throughout the storage period ordinarily encountered.

In the description of this invention, details of construction of the container and preparation of the coating material have been disclosed; however, it is to be understood that the scope of this invention is not limited by those details or conclusions but is limited only by the appended claims.

We claim:

1. A container for the storage and shipping of phosphatic fertilizers characterized by the presence of evolution of materials destructive to paper, said container comprising a multi-layered bag of kraft paper or the like, a strongly adherent coating of a homogeneous mixture of lime and an adhesive on the inner surface of the innermost layer of the multi-layered bag, said adhesive bonding the coating to the paper and extending through the lime and forming a strong coating providing a continuous protective layer adapted to intercept and neutralize materials destructive to the paper prior to contact with the paper.

2. A container for the storage and shipping of phosphatic fertilizers characterized by the presence or evolution of materials destructive to paper, said container comprising a multi-layered bag of kraft paper or the like, a strongly adherent coating of a homogeneous mixture of lime and starch on the inner surface of the innermost layer of the multi-layered bag, said starch bonding the coating to the paper and extending through the lime and forming a strong coating providing a continuous protective layer adapted to intercept and neutralize materials destructive to the paper prior to contact with the paper.

MARY C. FOX.
CHARLES C. HOWES.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
153,477	Croasdale	July 28, 1874
252,072	Buck	Jan. 10, 1882
671,548	Gordon	Apr. 9, 1901
1,565,798	Dillehay	Dec. 15, 1925
1,577,450	Crowell	Mar. 23, 1926