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IMPERVIOUS CONTAINER

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Fig. 1.

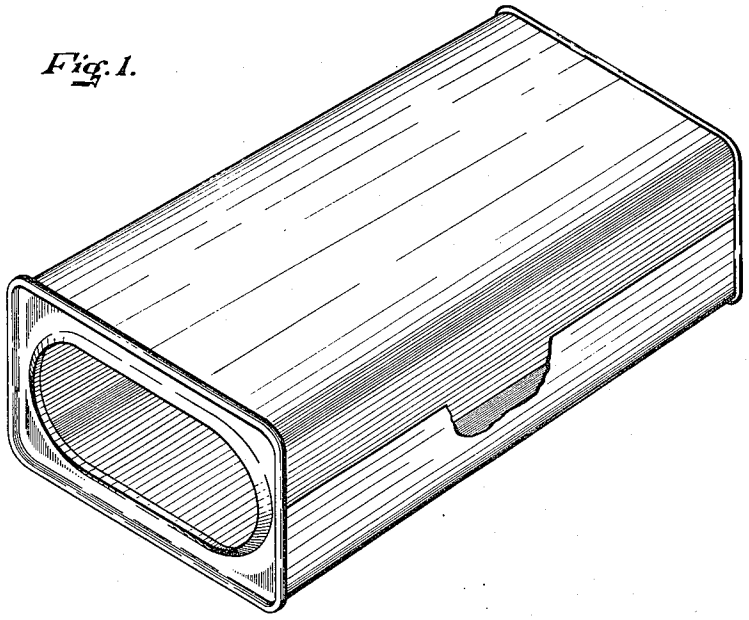
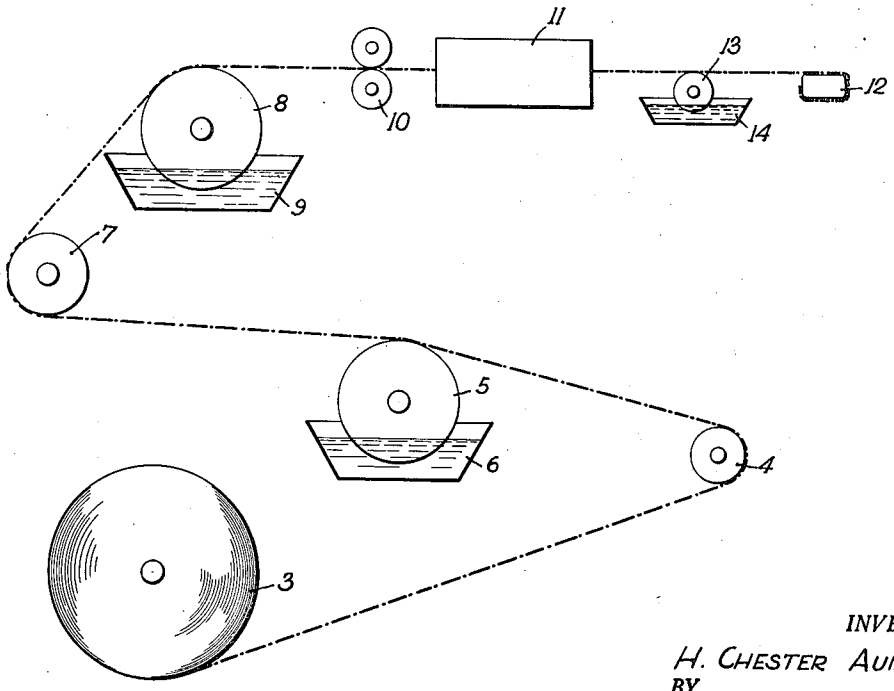


Fig. 2.



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IMPERVIOUS CONTAINER

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15 Claims. (Cl. 93—36)

This invention relates to the impregnating and coating of pervious material to render same impervious, and relates more particularly to the treatment of paper for the formation of impervious containers.

At the present time, metal cans, known generally as "tin cans", are universally used as containers for those foods and other natural and industrial products, containing oils, which, experience has shown, cannot be satisfactorily confined within the ordinary paper or pulp containers. It would be highly advantageous to use paper or pulp containers for many food products and industrial products on account of the decreased cost of the paper or pulp as compared to metal, but efforts which have been made to treat the pulp or paper entering into pulp or paper containers, prior to or after the formation of the containers, have been unsuccessful, due to the fact that the oils seep through or otherwise escape from the paper and pulp containers, or discolor same to an undesirable degree.

An object of this invention is to treat the fibrous material entering into a pulp or paper container to render it impervious to oils.

Another object of the invention is to saturate the fibrous material entering into a pulp or paper container with a substance which renders same impervious to oils.

Another object of the invention is to coat the walls of a container formed from fibrous material to render same impervious to oils.

Another object of the invention is to treat paper in such a way as to render it impervious to oils.

Another object of the invention is to render a fibrous container impervious to oil by impregnating and/or coating same with a substance non-soluble in oils.

It has been discovered that the class of natural gums known generally as acacia gum, when applied in a suitable solution to fibrous material, renders same impervious to oil. According to this invention, fibrous material, such as paper, is impregnated with and/or coated with acacia gum in solution to render same impervious to both oils which are present in food products and those industrial products which it would be desirable to store or transport in a paper or pulp container.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is a view of an impervious container according to this invention, and

Fig. 2 is a diagrammatic view of apparatus for rendering material entering into a container, according to this invention, impervious.

In one embodiment of this invention, a solution containing water and gum arabic, having a specific gravity of 1150, is applied to sheet paper, for example, to saturate and/or coat same. Gum arabic is one species of acacia gum and is non-soluble in oil. It has been found that when a paper container is formed from paper thus treated, it is impervious to the oil and other substances ordinarily present in the food products and industrial products, so that a paper container is just as satisfactory for those substances as a metal container, for example.

In another embodiment of the invention, a solution containing Egyptian gum, and having a specific gravity of 1100, is applied to sheet paper to saturate and/or coat same, and it has been found that this treatment renders a container formed from such paper impervious also to oils.

In a preferred embodiment of the invention, sheet paper is saturated with a solution having a specific gravity of 1100 of Egyption gum and that paper so treated then may or may not be coated with the other described solution containing water and gum arabic.

For example, for forming certain classes of containers a solution of Egyptian gum, which is relatively non-adhesive, may be used to saturate the paper which is afterwards rolled on a mandrel, for example, in convolutes or spirals to form a paper container. The convolutes or spirals may be held together with the usual corn dextrine glue, or they may be held together by the application of one of the other described adhesive solutions of this invention. The container, after being formed on the mandrel, can then be dipped in one or the other, or both, of the two solutions described.

The differences between the solutions are that the Egyptian gum solution is relatively non-adhesive and is less expensive, so that it is more suitable for use as a saturant, although it will, of course, serve as a coating. The gum arabic solution is more adhesive and also more expensive, and, therefore, is preferred as a binder or coating, although, of course, it may be used as a saturant.

Referring now to the drawing, Fig. 1 is a view of a container formed according to this invention. This container may be constructed in the usual manner from convolutes or spirals of paper stock, the successive layers or laminations of paper being glued together by means of a suitable adhesive. With the impregnating or coating

processes according to this invention, the adhesive may be the ordinary corn dextrine glue, but, for superior results, it is preferred that the gum arabic solution, or the silicate of soda solution, according to this invention, be used as the binder.

Referring now to Fig. 2, a roll of paper sheet from the roll 3 passes over the idler roll 4 and then in contact with the feed roll 5, which is immersed in an acacia gum solution, according to this invention, contained in the receptacle 6. The paper then passes over the idler roll 7 and its outer surface contacts with the feed roll 8, which is immersed in a gum solution, according to this invention, contained in the receptacle 9. The paper, now having its both sides moist with the treating solution, passes between the pair of squeeze rollers 10, which act to press the gum solutions thoroughly into the paper. It is preferred that the paper be completely saturated, but under some circumstances, as where the container is formed from several layers of treated paper, the paper may be coated on both sides in this process. The paper next passes through the drying chamber 11 and then is wound upon the mandrel 12 in the usual manner to form a paper container. During winding, a binder may be supplied through the feed roller 13, supplied from the tank 14, or in any other suitable manner. After the paper is rolled upon the mandrel 12 to form a cylinder, in the usual manner, it is cut to length and then dipped into a gum solution, according to this invention, to treat the raw edges and/or to coat the container.

The container formed as described above, ordinarily consists of from three to six layers of paper superimposed upon each other in convolutes or spirals. The successive layers are bound together by a binding solution of this invention. Were a container made from a single treated layer of paper, in spite of care in exercising the process, an air hole or other irregularity might be present in the paper which would permit oil to seep through, but by forming the container from several superimposed layers, the chances that irregularities would line up is extremely remote and so, through the use of several layers, perfection is obtained. While it is preferred that the paper, treated as described above, be thoroughly saturated, the coating solutions penetrating into the innermost fibres, where the container is formed from several successive layers of treated paper, it is obvious that the separate layers need not be thoroughly saturated, but that it may only be necessary that the layers be coated on both sides and the finished container dipped into a solution according to this invention.

It is realized that it has been proposed to dip finished containers, formed from paper which has not been treated according to this invention, into solutions for the purpose of rendering the container impervious to oils, but it is a fact that such experiments have been unsuccessful and it is believed that unless the sheets are thoroughly saturated according to one embodiment of this invention, it is necessary that a laminated container be formed from several layers of paper coated according to this invention and then dipped into a solution according to this invention. The container cylinder which, of course, need not necessarily be a cylinder, but may have any desired shape, then has its ends closed in the ordinary manner by means of metal or other suitable end portions which may be crimped over the outer portions of the container formed as has been described.

The gum solutions, according to this invention, have been found to be most desirable for the purposes described. The solutions are substantially colorless; the container formed is odorless, and it has been found that no vegetable, animal, or mineral oils can escape from a container thus formed, or enter into the fibres of the walls of the containers to cause any discoloration or weakening thereof.

While the invention has been described with respect to treatment of paper stock, obviously the treatment could be applied during the calendering of the paper where it is desired to use finished paper. It is also believed to be obvious that any pulp product, whether molded or otherwise formed, can be treated according to this invention.

While in the processes described the use of acacia gums has been described and these are preferable, since giving more desirable products, it has been discovered that a solution of a silicate of soda containing sufficient glycerine to prevent brittleness and cracking may be used according to this invention.

One process, according to this invention, which has been successful, involves the use of both an acacia gum and silicate of soda. In this particular process, the sheets of paper which are treated prior to being wound on a mandrel to form a container, are first impregnated or coated with an acacia gum solution, according to this invention, the successive layers of paper being bound together with the ordinary corn dextrine glue or with one of the binders according to this invention. The container is then dipped into a solution of silicate of soda and glycerine, a coating of resilient silicate of soda being thus formed on the outer and inner surfaces of the container. An advantage of using silicate of soda as a coating is that it is believed to be more water resistant than the acacia gum which is used for rendering the paper impervious to oil.

Whereas one or more embodiments of the invention have been described for the purpose of illustration, it should be understood that the invention is not limited to the details described as many modifications may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. A container of fibrous material having its fibres saturated with a non-adhesive acacia gum.

2. A container of fibrous material having its fibres saturated with a solution containing Egyptian gum.

3. The method of forming a container which comprises impregnating all of the fibres of a paper strip with a non-adhesive acacia gum solution, drying the saturated paper strip, winding the strip in a number of superimposed layers to form a container, binding the layers together with an adhesive, and coating the container thus formed with a solution containing an adhesive acacia gum.

4. The method of forming a container which comprises impregnating all of the fibres of a paper strip with a non-adhesive acacia gum solution, winding the strip in a number of superimposed layers to form a container, binding the layers together with an acacia gum adhesive, and coating the container thus formed with a solution containing an acacia gum.

5. The method of forming a container which comprises coating a paper strip on both sides with a non-adhesive acacia gum solution, drying the

coated strip, winding the strip in a number of superimposed layers to form a container, binding the layers together with an adhesive, and coating the container thus formed with a solution containing an acacia gum.

6. The method of forming a container which comprises coating a paper strip on both sides with a non-adhesive acacia gum solution, winding the strip in a number of superimposed layers to form a container, binding the layers together with an acacia gum adhesive, and treating the container thus formed with a solution containing an acacia gum.

7. The method of forming a container which comprises impregnating a paper strip with a non-adhesive acacia gum solution, winding the strip in a number of superimposed layers to form a container, binding the layers together with an acacia gum adhesive, and coating the container thus formed with a silicate of soda solution.

8. The method of forming a container which comprises coating a paper strip on both sides with a non-adhesive acacia gum solution, winding the strip in a number of superimposed layers to form a container, binding the layers together with an adhesive, and coating the container thus formed with a silicate of soda solution.

9. The method of forming a container which comprises coating a paper strip on both sides with a non-adhesive acacia gum solution, winding the strip in a number of superimposed layers to form a container, binding the layers together with an acacia gum adhesive, and coating the container thus formed with a silicate of soda solution.

10. A container having relatively superposed layers of fibrous material, each of said layers being impregnated with a solution including Egyptian gum.

11. A container having relatively superposed layers of fibrous material, each of said layers being impregnated with a solution of a gum which is relatively non-adhesive as compared with gum arabic, said layers being bound together by an adhesive solution including gum arabic.

12. A container having relatively superposed layers of fibrous material, each of said layers being impregnated with a solution of a gum which is relatively non-adhesive as compared with gum arabic, said layers being bound together by an adhesive solution including silicate of soda.

13. A container having relatively superposed layers of fibrous material, each of said layers being impregnated with a solution including a non-adhesive acacia gum, said layers being bound together by an adhesive insoluble in oil and said container having its interior coated over the treated fibrous material with a solution including silicate of soda.

14. A container having relatively superposed layers of fibrous material, each of said layers being impregnated with a solution including a non-adhesive acacia gum, said layers being bound together by an adhesive insoluble in oil and said container having its interior coated over the treated fibrous material with a solution including silicate of soda and glycerine.

15. The method of constructing a container which comprises saturating strip paper with a solution containing a non-adhesive acacia gum to render the same impervious to oil, drying the saturated strip paper, and then winding the strip in a plurality of superimposed layers and binding the successive layers together.

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