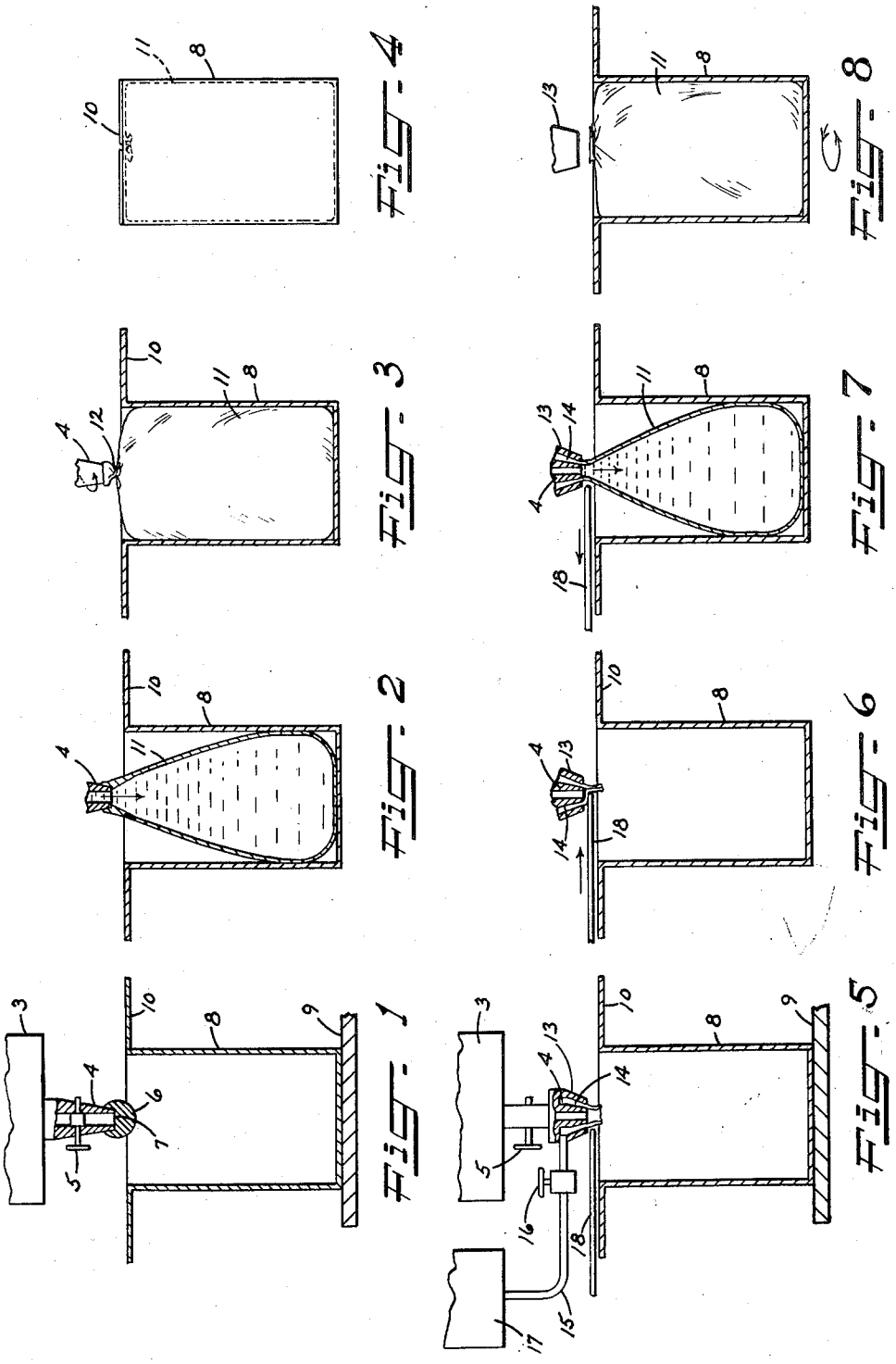
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METHOD FOR PACKAGING FLUID MATERIALS

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METHOD FOR PACKAGING FLUID MATERIALS

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This invention relates to systems for packaging fluid materials in an improved manner.

Heretofore, in the packaging of fluid materials such as liquids, of which milk is an example, paper cartons have been employed but they must be treated to render them leakproof. The type of treatment required to accomplish this purpose depends upon the nature of the liquid being packaged and, when it was aqueous in character as in the case of milk, a heavy waxing of the paper carton is used. Frequently, it has been found that chunks of the wax chip off because of jarring and flexing that occurs during shipment and when such breakage occurs on the inside of the container, the contents of the package become contaminated with the wax particles or chunks. Occasionally, also, leakage may occur. In the packaging of oils, similar difficulties occur when greaseproofing coatings are applied to the carton.

It is an object of the present invention to provide a simple and efficient system for the packaging of fluids such as liquids which avoid the difficulties of the breaking away of the particles or chunks of foreign material used for coating the carton, thereby avoiding contamination of the fluid contents with such foreign materials and reducing the danger of leakage. Other objects and advantages of the invention will be apparent from the drawing and the description thereof hereinafter.

In the drawing, which is illustrative of the invention,

Figures 1 to 4 illustrate successive stages of one system for carrying out the invention, and

Figures 5 to 8 illustrate a modified system for this purpose.

In general, the invention comprises the steps of providing a plastic mass or gob of a film-forming material and introducing the liquid to a confined area or space in contact with the plastic mass and utilizing the liquid material to be packaged for expanding the film-forming mass into the filled envelope which is confined within the walls of a surrounding receptacle which may be a paper carton or any other form of box, shell, or the like. A gob may be first formed of the entire amount of film-forming material needed to expand into the liquid enclosing envelope and the introduction of the liquid may occur entirely after the initial formation of the gob. Alternatively, only a part of the needed amount of the film-forming material may be present in the gob at first and during the introduction of the liquid as the gob expands to form the surrounding envelope, the additional film-forming material needed to form the complete full-sized envelope may be continuously supplied to the gob, such as by supplying such film-forming material continuously to an annular area or zone surrounding the area or zone of introduction of the liquid to be packaged. In either event, when the desired amount of liquid for a given package has been introduced into the film-forming mass, the top of the envelope of film-forming material is closed about the liquid within by pinching the film-forming material together or in any other fashion, such as by twisting the material at this point.

The present invention provides a simple, efficient and low-cost system for producing packages. The outer container of the package may be formed of any material such as low-cost, untreated paper cartons, the main function of the outer carton or receptacle being to confine the inner plastic envelope and requiring for this purpose a certain structural strength. The outer receptacle need not be leakproof against the liquid contents since this requirement is completely taken care of by the plastic envelope which serves to line the interior of the carton and by its flexibility conforms to the contour of the inside walls, bottom, side and top, of the receptacle. The receptacle need not be so rigid as to resist all flexing and deformation that may normally occur during handling and shipment since the inner lining is quite flexible and resists rupture when flexing and deformation, caused by normal shocks and impacts and bending forces, are imparted to the package. Because of the cohesive character of the film-forming material, there is no liability that parts of the envelope or lining will break off during impact and become deposited within the contents thereof.

The envelope may be made from a wide variety of plastic materials. Preferred types include the synthetic linear polymers of thermoplastic character and the elastomeric types. Examples include vinyl resins, such as polyvinyl acetate, copolymers of vinyl chloride and vinyl acetate, copolymers of acrylonitrile and vinyl acetate, polyacrylonitrile and copolymers of acrylonitrile with vinyl chloride, vinyl acetate, methacrylonitrile, and so forth, polyethylene, linear superpolymers of the polyester or nylon (polyamide) type, polyvinyl butyral, polyvinyl alcohols, polyvinyl ethers; elastomeric types may include neoprene, polymers of chloroprene, copolymers of butadiene with styrene or acrylonitrile, polyisobutylene, and so forth. It is to be understood that the mentioning of these particular materials is not intended to limit the invention thereto but merely to illustrate the wide variety of film-forming materials that can be used in carrying out the invention. Of course, the selection of any particular material depends upon the character of the liquid to be packaged. Thus, polyvinyl acetate, polyvinyl acetals and polyvinyl alcohols and neoprene, especially the latter two types, are highly advantageous when packaging oils especially of the hydrocarbon type. Polyvinyl acetate, polyvinyl chloride, related copolymers of these two monomers, and polyethylene are particularly adaptable to the packaging of aqueous liquids.

The film-forming material may be converted to a fluid gob by fusion or by the incorporation of plasticizers or solvents capable of dissolving or dispersing the material. Thus, any of the thermoplastic materials may be heated to fusion and the liquid to be packaged may be introduced into a gob of the fused material preferably at the same temperature as the fused material. If necessary, the temperature of fusion may be lowered by the incorporation of a plasticizer either of solid or liquid character. When plasticizers or solvents are incorporated into the plastic material to form the gob, the plasticizer or solvent is preferably insoluble in the liquid to be packaged unless the particular use to which the liquid packaged is to be put allows of the presence of the plasticizer or solvent that is used. The cooling of the fused plastic mass whether it contains or does not contain a plasticizer or plasticizers when the expanded envelope strikes the wall of the receptacle serves to set the mass into the shape desired conforming with the wall of the receptacle. Volatile solvents may be employed for dissolving or dispersing the film-forming material so that the gob may be formed at room temperature and expanded with a liquid at room temperature, the setting or coagulation of the expanded envelope occurring by volatilization of the solvent after expansion

into the receptacle. Known solvents and plasticizers may be employed, the selection depending upon the particular film-forming material to be used. Thus acetone or dioxane may be used for vinyl acetate or copolymers of vinyl acetate or vinyl chloride or acrylonitrile. The concentration of the film-forming material, when a solution thereof is used, is preferably as great as possible, the concentration being limited only by the necessity that the plastic mass expand under the pressure available for exertion upon the liquid during the filling operation and the lower limit of concentration being determined by the necessity to have a reasonably viscous coherent plastic mass which in the forming of the gob is capable of supporting it own weight so that the gob does not fall away from the filling nozzle of its weight but is expanded thereupon or therebelow by the weight of the liquid introduced.

As shown in the system of Figures 1 to 4, the liquid to be packaged may be supplied from a container 3 having a downwardly extending nozzle 4, the bore of the nozzle being controlled by a cock or valve 5. The gob 6 of the plastic film-forming material is supplied to the tip of the nozzle 4 so as to surround the opening 7 therein. A receptacle 8 supported on a table or other platform 9 is disposed beneath the nozzle 4 to receive the filled envelope. The receptacle 8 may be any form of packaging container. For example, it may be a cardboard carton of rectangular section having the usual flaps 10 extending from each of the four upper edges of the side walls and having the flaps at the bottom in overlapped and sealed relationship to close the bottom of the carton. Alternatively, the receptacle may be a cylindrical shell provided with a bottom cap secured in position at the time of filling and adapted to receive an upper telescoping cover.

After the receptacle 8 is disposed under the nozzle 4 and a gob of the film-forming material is applied to the tip of the nozzle as shown in Figure 1, the cock 5 is opened allowing the liquid from container 3 to enter the gob 6 and to expand it to form the envelope 11 as shown in Figure 2 wherein the filling operation is at an intermediate stage with the bottom of the envelope in contact with the bottom of the receptacle 8. The liquid in container 3 may be forced into the gob by pumping or by virtue of its own static hydraulic head in the container 3. If desired, the nozzle may be lowered with the gob thereon into the container before or during the initial introduction of the liquid, the nozzle being raised as the envelope fills the container 3. Figure 3 shows the completion of the filling where the envelope 11 is filled out to conform with the inside surfaces of the walls of the receptacle 8 after which relative rotation is imparted between the nozzle 4 and the receptacle 8 whereby the narrow neck at 12 of the film-forming material beneath nozzle 4 is twisted together to seal the top of the envelope. Thereafter, the neck 12 is pulled away from the nozzle 4 and the flaps 10 are folded over the top into overlapped relation and they may be sealed with the usual adhesives to form the final package shown in Figure 4 in which the envelope 11 is enclosed within the walls of the receptacle 8 and completely seals the enclosed contents therewithin to provide a leakproof and shock-resistant package.

A modification is shown in Figures 5 to 8 wherein the receptacle 8 is disposed on a support 9 as above. In this system, however, the nozzle 4 for supplying the liquid to be packaged from a container 3 under the control of a cock or valve 5 is provided with a concentric device for delivering the gob to the tip of the nozzle. Thus, the nozzle 4 may be surrounded by an extrusion head 13 providing an annular channel 14 between the outer wall of the nozzle 4 and the lower inside wall of the surrounding member 13. The annular channel 14 is supplied with the plastic film-forming material through a pipe or conduit 15 controlled by a cock or valve 16 and connected to a supply container 17 of the plastic material comprising the film-forming substance. A reciprocatory member 18 is disposed adjacent the extrusion device and is adapted to move across the tip of the device with a small clearance therebeneath for the purpose of closing the annular extruded column of plastic material beneath the tip of the nozzle 4 for the purpose explained hereinafter.

In using the system of Figures 5 to 8, after the receptacle has been placed in position on the support 9 beneath the extrusion device, the cock 16 is opened allowing plastic material to be extruded as an annular mass from the channel 14. The rod 18 is moved either by automatic reciprocatory mechanism or by hand shortly after the annular plastic mass has begun to come into its path. This position is substantially shown in Figure 5. In Figure 6, the rod 18 has reached the end of its stroke beneath the extrusion head and has caused the annular mass of plastic to be closed beneath the tip of the nozzle 4. Thereupon, rod 18 is retracted and cock 5 is opened to allow the liquid to be packaged to flow into the gob to expand it to fom the envelope 11 as shown in Figure 7. The gob in this system may be formed completely from the entire amount of plastic material needed to form the envelope before the liquid is introduced through the nozzle 4 or the liquid to be packaged may be passed into the gob before the entire amount of plastic material needed for the packaging has been supplied to the nozzle tip through the channel 14. In this latter event, flow of the plastic material and the liquid to be packaged may be effected simultaneously and concurrently through all or part of the final filling operation. In Figure 8, the envelope 11 has been completely filled, the cocks 5 and 16 have been closed and the neck of plastic material beneath the nozzle tip has been pinched off as by relative rotation between the nozzle and the receptacle. The package is then ready for closing to form a package like that shown in Figure 4.

Numerous liquids may be packaged in this fashion as well as fusible materials. For example, this system may be used to package oils (mineral, vegetable or animal), milk, or other aqueous liquids, soft drinks, syrups, alcoholic liquids, such as beer, wine, whiskey, etc., perfumes, inks, corrosive liquids, e. g. acids, concentrated or dilute alkalies, fusible materials such as butter, greases, waxes and fats. The fusible materials mentioned may be heated to their melting point and fed into a gob of plastic material maintained at the temperature of the fused material to be packaged.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. Method of packaging flowable materials in a fluid-tight rigid container including the steps of providing a gob of plastic film-forming material, disposing an open end of a rigid container adjacent to the gob of plastic film-forming material, delivering a flowable material to be packaged into the gob of plastic material to expand the same within the rigid container and line the internal walls thereof, and sealing the expanded film-forming material at the point of delivery of the flowable material.

2. Method of packaging flowable materials in a fluid-tight rigid container including the steps of providing a gob of plastic film-forming material, disposing an open end of a rigid container adjacent to the gob of plastic film-forming material, delivering a flowable material to be packaged into the gob of plastic film-forming material to expand the same within the rigid container, said flowable material being delivered to the gob of film-forming material under pressure sufficient to expand the gob of plastic material into an envelope about the flowable material, said envelope engaging with and lining the internal walls of the rigid container, and sealing the

envelope at the point of delivery of the flowable material.

3. A method of packaging flowable materials in a fluid-tight rigid container including the steps of providing a gob of plastic film-forming material, disposing an open end of a rigid container adjacent to the gob of plastic film-forming material, delivering a flowable material to be packaged into the gob of plastic material to expand the same within the rigid container as an envelope about the flowable material, continuously and simultaneously supplying plastic film-forming material and flowable material to be packaged until the enclosing envelope engages with and lines the internal walls of the rigid container, and sealing the envelope at the point of delivery of the flowable material.

4. Method of packaging flowable materials in a fluid-tight rigid container including the steps of providing an annular hollow column of plastic film-forming material, disposing an open end of a rigid container adjacent to the hollow column of plastic film-forming materials, closing

the lowermost end of said hollow column of plastic film-forming material, delivering a flowable material to be packaged into said column of plastic material to expand the same within the rigid container and line the internal walls thereof, and sealing the expanded column of film-forming material at the point of delivery of the flowable material.

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