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(54) **VALVED LONG FLOATING TOY BALLOON**

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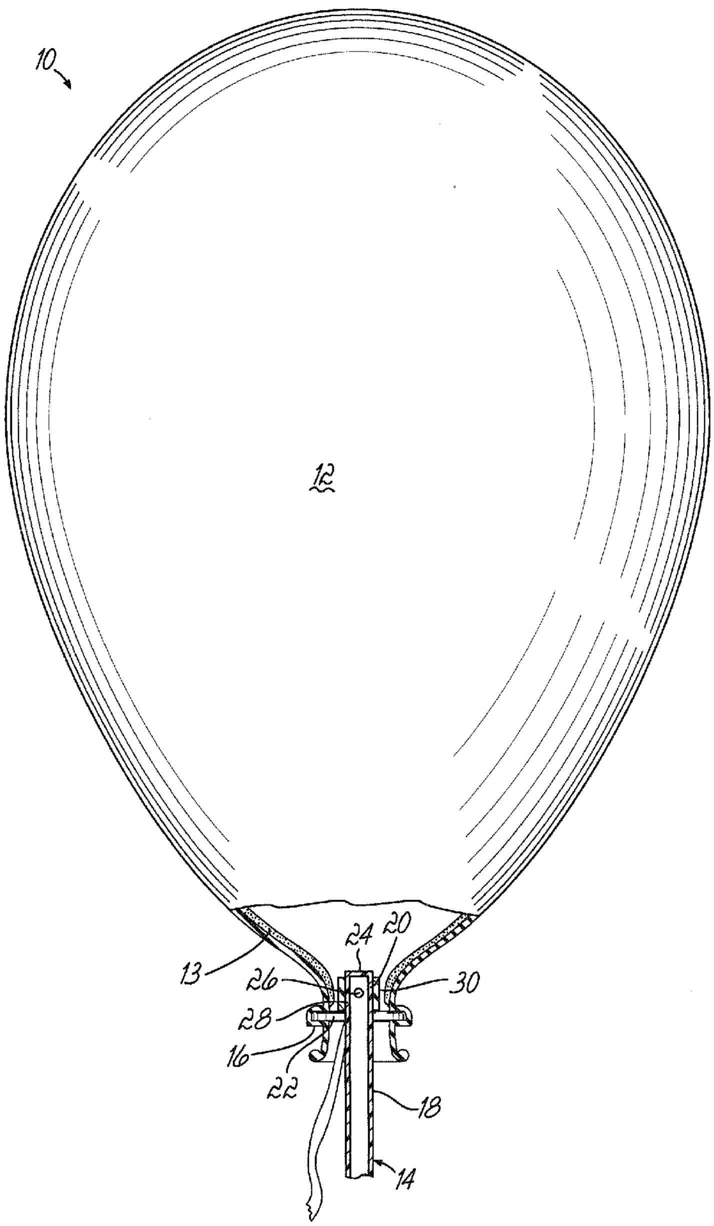
(57) **ABSTRACT**

Toy balloons that have an internal surface coated with a barrier coating include a one-way valve. The one-way valve incorporates an inlet stem that is surrounded by an expandable elastomeric collar. The coating solution is an aqueous solution having a low concentration of polyvinyl alcohol and a carbohydrate. A minimal amount of coating composition is used. This allows preassembly and precoating of toy balloons with one-way valves that can be stored for up to one year without drying out.



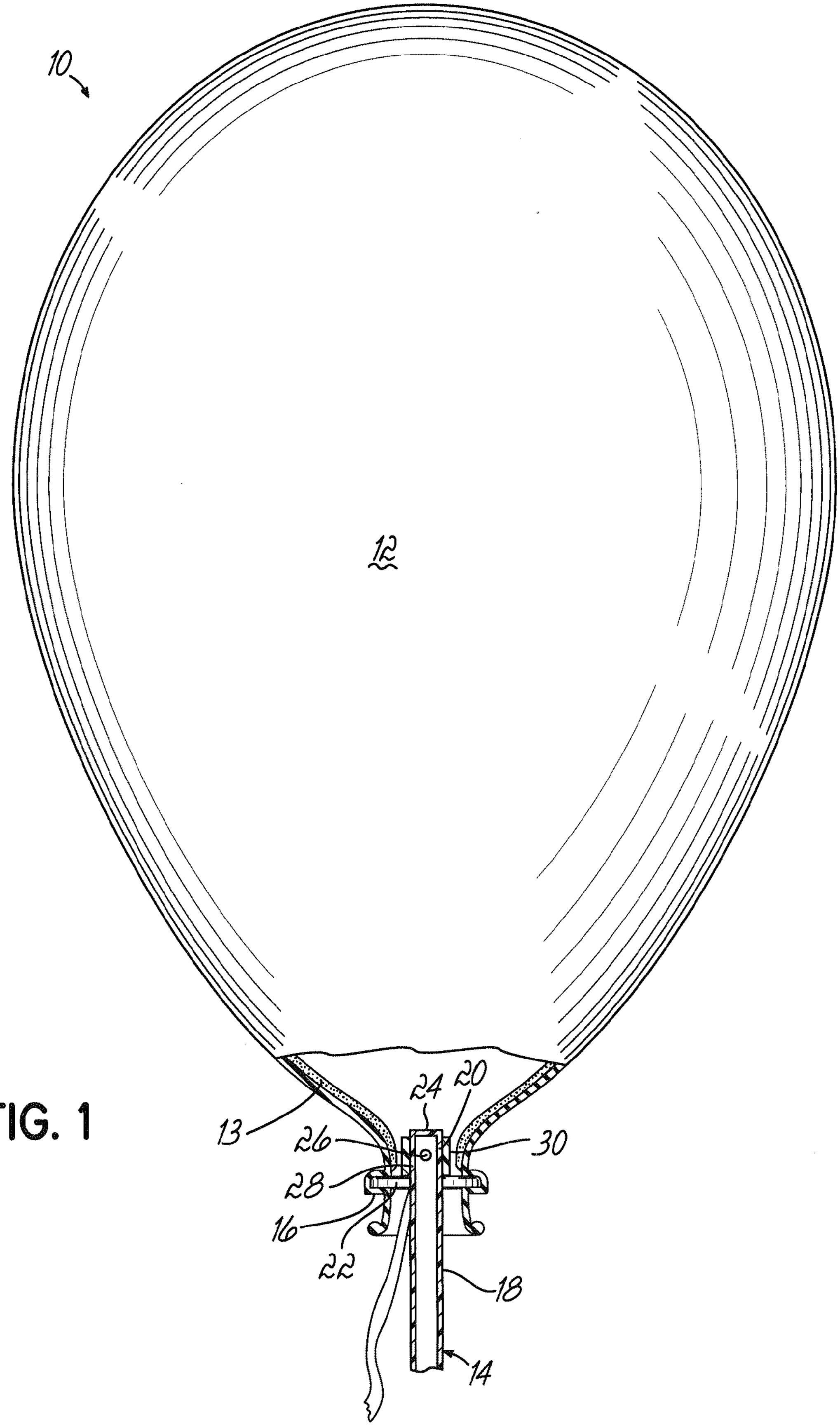


FIG. 1

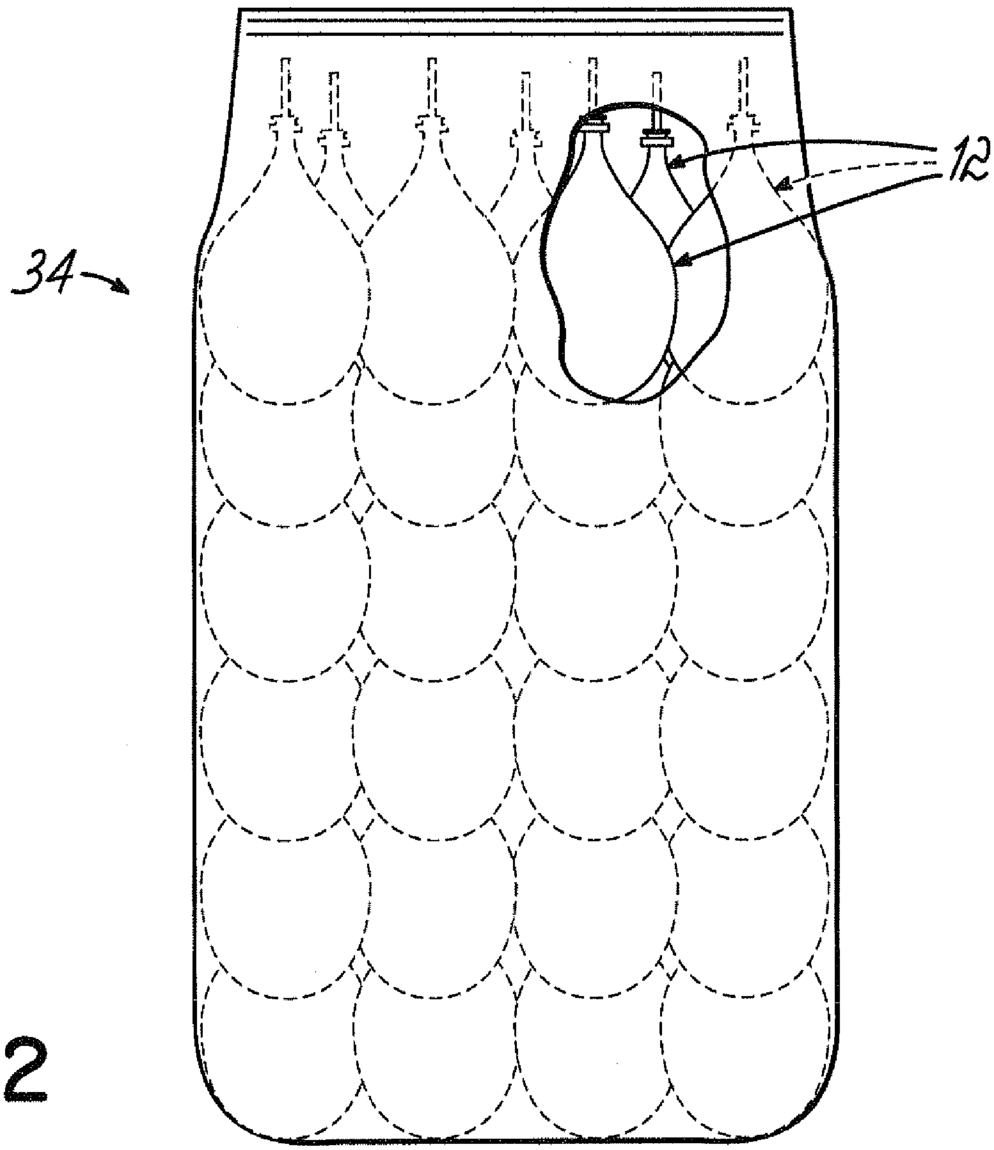


FIG. 2

VALVED LONG FLOATING TOY BALLOON

BACKGROUND OF THE INVENTION

[0001] It is known to increase the floating lifetime of elastomeric toy balloons by applying a barrier coating to the surface of the balloons prior to inflation with helium. Burchett U.S. Pat. No. 4,634,395 and Sinclair U.S. Pat. No. 5,244,429 disclose applying a liquid barrier coating agent to the inside of toy balloons before inflation with helium. This coating dries after inflation to form a barrier coating on the surface of the balloon, which increases the floating lifetime of the balloon by retarding the diffusion of helium out through the wall of the balloon.

[0002] The coating agents disclosed by Burchett and Sinclair are generally high viscosity aqueous solutions containing polyvinyl alcohol. The methods disclosed involve inserting the liquid into the balloon and rubbing the outside of the balloon to spread the coating over the inside surface prior to inflation. Once the balloon is inflated, the coating dries as water in the coating solution diffuses out through the wall of the balloon. The coating is applied before inflation of the balloon since the coating must be wet at the time the balloon is inflated in order to be able to spread out over the entire inner surface of the balloon. If the coating is dried before the balloon is inflated, it cannot spread out and the dried coating tears away from the balloon surface as the balloon is inflated. In such case, an incomplete barrier coating is left on the surface and the balloon will not have an extended floating life.

[0003] One problem with the coating methods of Burchett and Sinclair is that some degree of training on injecting the coating solution into the balloon is required. A very accurate amount of liquid coating solution must be injected. Too little solution will not give the desired increase in floating life and too much solution will make the balloon too heavy to float at all. Furthermore, different amounts of coating liquid are required for different sizes of balloons. Unfortunately, in mass marketing applications such as grocery store chains, or restaurants, or party stores there is a high turnover of employees at the level who would inflate and distribute balloons to the public. It is therefore difficult to keep personnel in these positions who have been properly trained in the use of the coatings of Burchett and Sinclair. The end result is that because of the time and training required to properly use these coatings, they are simply not used much of the time.

[0004] It has long been known to insert one-way valves into the necks of uninflated elastomeric toy balloons. These one-way check valves allow an inflation gas such as helium to pass into the balloon through the valve, but do not allow the helium to escape back through the valve once the balloon is inflated. Many of these valves have ribbons or strings already attached to them so that the end user simply has to inflate the balloon and does not have to either tie a knot in the neck of the balloon or attach a string or ribbon to the balloon. This string or ribbon serves the purpose of a tether, which is either held in the hand or tied to a weight to keep the inflated, lighter-than-air balloon from floating away.

[0005] These one-way valves are often used with elastomeric balloons, which have some form of advertising printed on the surface of the balloon. These advertising balloons with valves are frequently given away free to the public in order to promote the subject of the advertising such as stores, restaurants, etc. The valves are typically inserted into the balloons by the company that does the printing on the balloon. The printed balloons containing valves with ribbons are placed in a bag and shipped to the venue where the balloons are to be inflated with helium and distributed. The employee who distributes the balloons simply has to inflate them and hand them out. The presence of the valve with the ribbon greatly speeds up this process since the neck of the balloon does not have to be tied and a ribbon does not have to be attached.

[0006] In other cases, the above-mentioned valves are inserted into balloons that have no printing on the surface. The valves are inserted by the balloon manufacturer, and the uninflated balloons with valves are shipped to the customer who then inflates them and gives them away. Again, the presence of the valve with ribbon attached greatly speeds up the process since the neck of the balloon does not have to be tied and a ribbon is already attached. These balloons are often given away free to the public as a promotion. In these cases also, the one way valve with ribbon attached greatly speeds up the process.

[0007] Most valves incorporate a flap valve in order to provide for filling the balloon with gas and preventing the gas from leaking. The pressure of the inflating gas on the flap closes the valve. One such flap valve, for example, is disclosed in Nelson U.S. Pat. No. 6,814,644. Another type of one-way valve for toy balloons is disclosed in Cole U.S. Pat. No. 4,911,674. This incorporates a hollow tubular shank that is closed at one end. The closed end has an opening along the side wall and is, in turn, surrounded by an expandable elastomeric collar. Injection gas forced through the shank causes the collar to expand allowing the gas to be admitted into the balloon.

[0008] These elastomeric toy balloons with one-way valves are typically 9 inches (23 cm) to 11 inches (27.9 cm) in diameter when inflated, although sometimes balloons up to 16 inches (40.6 cm) or even 24 inches (61 cm) in diameter can be used. Since the smaller 9-inch balloons require much less helium than larger size balloons, and are therefore much less expensive, they are the preferred size. However, a disadvantage of these smaller balloons is that, due to the added weight of the valve, they have a relatively short floating lifetime. Typically, a 9-inch (23 cm) balloon with a one-way valve has a floating lifetime of only 4.5 to 8.5 hours. Their value as an advertising tool would be enhanced if they could be made to float significantly longer.

[0009] The coatings of Burchett and Sinclair have heretofore not been used in combination with the above balloon valves for a number of reasons. One reason is that the valve adds significant weight to the balloon and the coating solution also adds weight. Therefore, the coatings as taught by Burchett and Sinclair result in 9-inch balloons that do not float at all when combined with a one-way valve. In the case of 11-inch balloons with one-way valves, the coating as taught by Burchett does not float at all and the coating taught by Sinclair results in a much reduced floating life compared to the same coating when no valve is used.

[0010] The Burchett coating is manufactured by the Hi-Float Company, Louisville, Ky. and sold under the product name "HI-FLOAT". The Sinclair coating is manufactured by the same company and sold under the name "SUPER HI-FLOAT". The instructional literature for both of these products specifically teaches that they should not be used in 9-inch balloons due to the added weight, even without the additional weight of a one-way valve.

[0011] The coating solutions of Burchett and Sinclair are not injected into balloons which contain one-way valves at the time of inflation because the thick, viscous nature of the coating solutions prevent them from being injected through the valve once the valve is in place on the neck of the balloon. This is because the balloon valves are designed for the passage of inflating gasses such as helium or air. The user would have to first remove the valve from the balloon, inject the coating solution through the neck of the balloon, and then replace the valve. Or, the user could inject the solution into the neck of the balloon that did not have a valve, and then insert a valve. In either case the whole purpose of the one-way valve with ribbon would be defeated since that purpose is to speed up and simplify the process of inflating and distributing balloons.

[0012] The coatings of Burchett and Sinclair have not been injected into balloons with the valves well in advance of the time of inflation for a number of other reasons. The coating can dry out in the uninflated balloon over time and will therefore not produce a barrier coating once the balloon is inflated as explained earlier. Another problem is that with many of the balloon valves, such as Nelson U.S. Pat. No. 6,814,644 B1, the coating solution was found to foul the seal of the one-way valve in such a way that a large percentage of the valves failed to seal and leaked helium out of the balloon soon after inflation. These balloons therefore have very short floating times.

[0013] In addition, under typical storage conditions, valves such as those disclosed in Nelson '644 were found to leak coating solution out of the uninflated balloon through the valve in many cases. This is because in order for the one-way valve to close, the balloon must be inflated. It is the pressure inside the inflated balloon that forces the one-way valve closed. When the balloon is not inflated, the valve does not close, permitting leakage of the coating solution out of the balloon. Even a single such leaking balloon can ruin a whole bag of balloons by causing them to stick together. For these reasons, barrier coatings have not heretofore been used in conjunction with latex balloons containing one-way valves.

SUMMARY OF THE INVENTION

[0014] The present invention is premised on the realization that a toy balloon precoated with a liquid coating to improve its buoyant lifetime and including a pre-installed one-way valve will be buoyant when inflated if the selected coating composition utilizes a low percentage of polyvinyl alcohol with a higher percentage of a water soluble carbohydrate and wherein a low amount of the coating is applied. The precoated balloon utilizes a one-way valve that incorporates a sealing member that is urged into a sealing position without any applied pressure.

[0015] In a preferred embodiment, the coating composition includes from about 3% to about 10% polyvinyl alcohol and a ratio of carbohydrate to polyvinyl alcohol of about 3:1. Less than 4 ml of the solution is applied to a 9-inch balloon, and less than 7 ml of the solution is applied to an 11-inch balloon.

[0016] These precoated balloons are stored in packages having a low vapor permeation rate.

[0017] The selected one-way valve will not permit leakage and, further, the coating solution will not dry out during a prolonged period of storage. This permits the balloons of the present invention to be inflated quickly and easily by virtually anyone.

[0018] The objects and advantages of the present invention will be further appreciated in light of the following detailed description and drawings in which:

BRIEF DESCRIPTION OF THE DRAWING

[0019] FIG. **1** is a front elevational view partially broken away of a balloon incorporating a one-way valve according to the present invention; and

[0020] FIG. **2** is a front elevational view partially broken away of a package containing a plurality of precoated balloons with one-way valves.

DETAILED DESCRIPTION

[0021] The term "elastomeric toy balloon" is meant herein to include those inflatable elastomeric toy balloons having at least one of more or all of the following parameters.

[0022] The first parameter concerns the inflated diameters of such balloons. Elastomeric toy balloons as now manufactured are smaller in circumference and diameter in the uninflated state than in the inflated state. Upon inflation with a gas, and preferably a lighter than air gas such as helium, the elastomeric toy balloons are initially filled with the gas and then materially stretched or expanded as they are inflated to their inflated diameters. Thus the term "inflated diameter" refers herein to the diameters of elastomeric toy balloons in the range of from about 10 cm up to about 80 cm, when the elastomeric toy balloon material is stretched via inflation with a gas. Generally such balloons stretched to buoyant capacity are about 500% greater in diameter than in an unstretched or relaxed state.

[0023] The second parameter that may be used to define elastomeric toy balloons herein is directed to the weight of the elastomeric toy balloons. More particularly, elastomeric toy balloons as defined herein preferably have uninflated weights in the range of from about 0.5 gms up to about 30 gms.

[0024] The third parameter, which may be used to define elastomeric toy balloons of this invention, is concerned with the wail thickness of such elastomeric toy balloons. Generally, the wall thickness of such elastomeric toy balloons preferably ranges from about 0.2 mm to about 0.5 mm when the balloons are in an uninflated and unstretched conditions.

[0025] The fourth parameter relative to the definition of the term "elastomeric toy balloon" is the surface-to-volume ratio of such elastomeric toy balloons. In general, the surface-to-volume ratio is determinative of the buoyancy of a balloon. The terms "surface" and "volume" as used therein refer to the surface area and volume of the elastomeric toy balloons, respectively, when in the inflated condition. As balloons increase in size, the surface-to-volume ratio decreases. With the large balloons, materials used for the balloons may be heavier since there is a larger volume of gas available per unit of surface area to support the heavier materials. On the other hand, as balloons decrease in size, the surface-to-volume ratio increases. This requires lighter materials to be used to make the smaller balloons to ensure adequate buoyancy. In other words, there is a much smaller volume of gas available per unit of surface area with the smaller balloons. Thus, weight is a much more critical factor from a buoyancy standpoint as the balloon size is reduced and the surface-to-volume ratio increases.

[0026] In the smaller inflatable elastomeric toy balloons widely available throughout the industry, the surface-to-volume ratio is large and the weight of the elastomeric toy balloon materials must therefore be carefully monitored if the elastomeric toy balloons are to float at all. The present invention therefore is generally concerned with the smaller elastomeric toy balloons having surface-to-volume ratios in the range of from about 0.075 cm^2/cm^3 to about 0.6 cm^2/cm^3.

[0027] Finally, the last parameter useful to define the elastomeric toy balloons is the material from which the elastomeric toy balloons of this invention are produced. Generally speaking, the elastomeric toy balloons are formed from rubber, such as natural rubber, and more particularly from natural rubber latex.

[0028] The solution used to coat these balloons will include water, polyvinyl alcohol and a water-soluble carbohydrate. The term "polyvinyl alcohol" as used throughout the specification refers to water-soluble polyhydroxy compounds, which can be generally characterized, for instance, by the presence of (—CH_2—CHOH—) units in the polymer chain. The term "polyvinyl alcohol" is also intended herein to include suitable derivatives of the water-soluble polyhydroxy compounds mentioned above, particularly those in which some of the hydroxyl groups are acetylated. These polymers are ordinarily prepared by the replacement of the acetate groups of polyvinyl acetate with hydroxyl groups as by, for example, hydrolysis or alcoholysis. The percent of acetate groups replaced by hydroxyl groups is the degree of hydrolysis of the polyvinyl alcohol thus formed and indicates the percent of hydroxyl groups present in the polyvinyl alcohol out of the total possible hydroxyl groups. This invention relates to polyvinyl alcohols with a degree of hydrolysis above about 85 percent.

[0029] It will be appreciated by those skilled in the art that polyvinyl alcohol (PVOH) as discussed herein includes those polyvinyl alcohols, chemically modified, altered or otherwise, that can be used in accordance with the teachings of the present invention. For example, water resistance of the dried PVOH film can be enhanced by the addition of organic materials that are aldehydes or aldehyde donors to the aqueous liquids.

[0030] In another example, the polyvinyl alcohols may be partially etherified by reaction with alkaline oxides. It should be realized that the presence of small amounts of hydroxyethoxylation can reduce gelling of stored aqueous liquids containing a polyvinyl alcohol and thereby increase the shelf life of solutions. Also, the viscosity of the polyvinyl alcohol coating liquids may be reduced by the addition of a viscosity reducing agent, such as hydrogen peroxide, in desired effective amounts.

[0031] In yet another example, the hydroxyl groups on the polyvinyl alcohol backbone in general may be partially reacted to form, for example, ethers, esters, acetals, and/or ketals using techniques well known in the art. It is intended that those suitable derivatives of these and the above polyvinyl alcohol derivatives so obtained and the like are within the scope of the present invention.

[0032] The solution used to coat balloons will also include a water-soluble carbohydrate, or saccharide. These saccharides include mono- and disaccharides including dextrose, glucose including the monohydrate, sucrose, arabinose, lactose, mannose, maltose, fructose, galactose, amylose, allose, altrose, talose, gulose, idose, erythrose, threose, lyxose, xylose, arabinose, rhamnose, and cellobiose. Low molecular weight water-soluble polysaccharides such as glycogen are also included within the scope of this invention.

[0033] It should be clear that other ingredients can be added to the treating solution without substantially altering the manner in which it functions to obtain the desired result. For example, small amounts of mold preventing additives can be used to increase the shelf life of the solution. These include chemicals such as "Mycoban".TM. (Pfiger, Inc.) or "Dowicide".TM. (Dow Chemical Co.) added at levels up to 0.5 percent by weight. Also the formation of undesirable gel in the treating solution can be inhibited through the addition of up to 0.3 percent by weight "Triton" X-100.TM. (Rohm & Haas Co.). The viscosity of the treating solution can be lowered somewhat by the addition of up to 3 percent by weight of hydrogen peroxide.

[0034] The coating solution is prepared by sprinkling polyvinyl alcohol solids into the vortex formed by rapidly stirring cold water. Rapid stirring is continued for 10 minutes in order to thoroughly wet and disperse the solids. Heat is then supplied by means of an immersed hot water coil to warm the slurry to about 90 degrees Centigrade in order to dissolve the polyvinyl alcohol. During this heating step the agitation is slowed to prevent shear degradation of the polymer. This heating step is continued for about 4 hours until the polyvinyl alcohol is completely dissolved.

[0035] Following the heating step the solution is cooled to about 60 degrees Centigrade and the water-soluble carbohydrate is added and thoroughly blended into the solution. The carbohydrate is added after the solution has been cooled to prevent scorching and discoloring of the solution.

[0036] The level of polyvinyl alcohol in the solution can range from as little as about 3 percent by weight to as high as about 20 percent by weight of the total solution. Concentrations less than about 3 percent by weight do not give the desired increase in buoyant lifetime without multiple coatings. Higher concentrations of polyvinyl alcohol are too dense to provide buoyancy. Generally about 11% PVOH by weight is preferred.

[0037] The weight average molecular weight of the polyvinyl alcohol can range from about 13,000 to about 186,000. The preferred embodiment is a polyvinyl alcohol having a weight average molecular weight of 124,000 to 186,000 and used at a concentration of about 8 to 14 percent by weight. Although the preferred embodiment employs a polyvinyl alcohol that is about 87.0 to 89.0 percent hydrolyzed, other polyvinyl alcohols having a degree of hydrolysis up to over 99 percent can be used. A preferred material is Vinol **540** sold by Air Products and Chemicals, Inc.

[0038] The carbohydrate used in the solution can range from 1 percent to over 35 percent by weight. Below about one percent by weight, the carbohydrate provides very slight benefit in float life. At low relative humidity, increasing the level of carbohydrate continued to provide increasing buoyant lifetime up to the maxim ratio examined which was four times the level of polyvinyl alcohol (i.e., the dried film contained about 80 percent carbohydrate). At very high relative humidities, it was found that high carbohydrate levels were not appreciably better than lower loadings. The preferred embodiment uses a coating solution containing dextrose monohydrate at a level of 3 to 30%, preferably about 2 times the percentage of the PVOH, with about 24% by weight preferred.

[0039] As shown in FIG. **1**, the present invention provides for a prefilled assembly **10** (shown in an inflated state) that incorporates a balloon **12** coated with the polyvinyl alcohol coating solution **13** of the present invention, wherein a one-way valve **14** is positioned in the neck **16** of balloon **12**. The one-way valve must have a sealing member that is positively urged into a sealing position even when not attached to the balloon or when the balloon is not inflated. In other words, the closing of the valve must be accomplished by some means other than gas pressure. A suitable one-way valve **14** is of the type disclosed in Cole U.S. Pat. No. 4,911,674, the disclosure of which is hereby incorporated by reference. This includes an inlet tube **18** connected to an outlet tube **20**, and a disk **22** where the two join. The outlet tube **20** is sealed at its one end **24** and includes a hole or opening **26** in its side wall **28**, which permits gas to pass through the inlet tube **18** into the balloon **12**. Surrounding the side wall **28** of outlet tube **20** is an elastomeric collar **30** or sealing member, which compresses against the side wall **28** of the outlet tube **20**, sealing the hole **26**. When pressurized gas is introduced through the inlet tube **18**, it causes the collar **30** to expand, allowing air through the hole **26** into the balloon **12**. The elasticity of the collar **30** prevents gas from flowing in the opposite direction out of the balloon.

[0040] Another suitable valve is disclosed in U.S. Pat. Nos. 4,167,204 and 3,994,324, the disclosures of which are hereby incorporated by reference. The sealing member incorporated in the valve disclosed in these patents is an elastomeric sealing disk held in a closed or sealing position by a cage portion. When gas is injected, the seal member is forced to flex, opening the valve.

[0041] The coating solution is applied to the inside of the balloon prior to inserting the one-way valve **14** into the neck **16** of the balloon **10**. The amount of coating solution applied will vary depending upon the size of the balloon. Generally, the coating will be applied at a rate of 0.0006 to 0.0021 ml/cm^2 of inflated surface area, with 0.0015 ml/cm^2 preferred. For a 9-inch balloon, there should be from about 1 to about 4 ml of solution, with about 3 ml preferred. For an 11-inch balloon, the amount will be from about 2 ml to about 10 ml, with about 4 ml preferred. The amount will vary proportionately with the inflated size of the balloon. A larger balloon obviously will have a larger surface area, but a lower volume to mass ratio, requiring additional coating and having sufficient buoyancy to support the coated the balloon when inflated.

[0042] The coated balloons are then inserted into a package **34**, as shown in FIG. **1**. Multiple balloons **12** are generally prepackaged together for shipping purposes. The package **34** should be formed from a film having a vapor permeation of about 0.025 gm H_2O/day/100 in^2, or less. Preferably, is it formed from a polyethylene film at least 2 mils thick. This will insure that the coating solution will not evaporate rapidly, providing a shelf life of several months and up to a year.

[0043] The invention will be further appreciated in light of the following examples.

EXAMPLE 1

[0044] Toy latex balloons having an inflated diameter of 9 inches (23 cm) were injected with the coatings and amounts taught by Burchett '395 (Sample B) and by Sinclair '429 (Sample C) and were sealed using a one-way valve like the one disclosed in Cole '674. The balloons were then rubbed to distribute the coating over the inside surface and inflated with helium. Four balloons were prepared in each sample. The balloons were tethered to a bench top using the ribbon attached to the valve and the time was measured until the balloon was no longer buoyant. Sample D was prepared using the same formulation of Sample C, but at the much-reduced coating level. The present invention, Sample E, contains balloons that were treated using a reduced coating level well below the level taught by Sinclair, and a formula having 10.8% PVOH and 23.7% dextrose. Also, for comparison, balloons containing no coating solution at all were tested as controls (Sample A).

TABLE 1

Float Life of 9-inch Helium Filled Balloons with One-way Valves (Average of 4 balloons each sample)

SAMPLE	TREATMENT	ML COATING SOLUTION	FLOAT LIFE
A	Valve only	0	6.5 hours
B	Valve plus Burchett Coating Solution	6.0	0 hours
C	Valve plus preferred Sinclair Coating Solution	4.8	0 hours
D	Valve plus preferred Sinclair Coating Solution	2.5	1.8 days
E	Valve plus Present Invention Coating Solution	2.5	3.7 days

[0045] The results in Table 1 showed that the prior art preferred embodiments of the coating formulas of Burchett (Sample B) and of Sinclair (Sample C), when used at levels suggested in these patents in combination with one-way valves, resulted in balloons that did not float at all when inflated with helium. When the level of coating taught by Sinclair was reduced to the level of the present invention (Sample D), the balloons floated an average of 1.8 days. The method of the present invention (Sample E), which used a Sinclair formulation outside the range of this preferred embodiment, and at much lower coating amounts than Sinclair taught, gave an average floating life of 3.7 days. By comparison, balloons containing a one-way valve but with no added coating, floated an average of only 6.5 hours. Thus, the treatment of the present invention gave a float life that was over thirteen times longer than the valved balloon without treatment.

EXAMPLE 2

[0046] Example 1 was repeated using toy latex balloons having an inflated diameter of 11 inches (28 cm). The coating levels were adjusted so that the larger balloons had the same coating weight per unit of surface area as in Example 1, 0.0015 ml/cm^2. The floating lives were measured and are reported in Table 2.

TABLE 2

Float Life of 11-inch Helium Filled Balloons with One-way Valves (Average of 4 balloons each sample)

SAMPLE	TREATMENT	ML COATING SOLUTION	FLOAT LIFE
A	Valve only	0	18 hours
B	Valve plus Burchett Coating Solution	9.0	0 hours
C	Valve plus preferred Sinclair Coating Solution	7.0	4.5 days
D	Valve plus preferred Sinclair Coating Solution	3.6	3.8 days
E	Valve plus Present Invention Coating Solution	3.6	8.5 days

[0047] The results show the prior art coating of Burchett (Sample B) resulted in a balloon that did not float at all when a one-way valve was attached. The preferred prior art coating of Sinclair (Sample C), at the preferred level disclosed in this patent, gave an average float life of 4.5 days. The method of the present invention (Sample E), which uses a formulation disclosed in the Sinclair patent but outside of the preferred range, and at a much lower coating level than suggested in the Sinclair patent, gave a floating life average of 8.5 days. For comparison, balloons with the preferred coating taught by Sinclair, but used at the reduced level of the current invention (Sample D), floated an average of 3.8 days. Thus, in this case, the present invention gave a float life that was double that of a balloon coated with the preferred coating disclosed in the Sinclair patent, and was eleven times longer than the control balloons without a coating (Sample A), which floated an average of 18 hours.

EXAMPLE 3

[0048] 3.6 ml of coating solution were injected into two sets of 20, 11-inch balloons each. One-way flap valves were inserted into one set of 20 balloons and they were placed into a 6-inch by 6-inch plastic bag. Once valves, as shown in FIG. **1**, were inserted into the second set of 20 balloons, they were placed in the same kind of bag. Next, an 8-pound weight was placed on each bag for one week to simulate storage and shipment conditions. After one week, the bags were opened and the balloons were inflated.

[0049] 20% of the balloons containing the flap valves had leaked coating solution. When inflated, these balloons would not stay inflated because of rapid leakage of helium out through the valve. The valves would not seat properly.

[0050] On the other hand, none of the balloons containing the valves, as shown in FIG. **1**, had leaked coating solution out of the balloons. On inflation, all of these valves worked perfectly to hold the helium in the balloons.

[0051] The present invention allows for packaging of multiple balloons prefilled with a coating solution, and storage of these for up to a year as shown in FIG. **2**. Due to the particular valve selected, leakage is not a problem. This allows for prepackaging of balloons with a proper dosage of coating solution with a one-way valve with a ribbon. Very little training of employees is required to inflate and distribute the balloons. The present invention provides a balloon that will float ten times longer than a similar valved balloon without a barrier coating, which is particularly beneficial for balloons printed with advertising. Further, the packaging prevents the coating from evaporating, extending the shelf life of the product.

[0052] This has been a description of the present invention along with the preferred method of practicing the present invention. However, the invention itself should only be defined by the appended claims.

What is claimed is:

1. A plurality of uninflated balloon assemblies, each balloon assembly comprising an uninflated toy balloon having an internal portion and a neck, a coating composition in said internal portion;

a one-way valve fixed in said neck, said one-way valve having a flexible sealing member positively urged into a sealing position when said balloon is not inflated;

said coating composition comprising an aqueous solution of polyvinyl alcohol and a carbohydrate wherein polyvinyl alcohol is from 3 to 20 percent by weight of said coating composition and wherein said carbohydrate is present in a ratio to the polyvinyl alcohol of 1:1 to 3:1; and

wherein said balloons have 0.0006 to 0.0021 ml/cm^2 of coating solution based on said balloons inflated capacity.

2. The plurality of balloon assemblies claimed in claim **1** wherein said balloon assemblies are contained in a bag formed from a polymeric film, said polymeric film having a vapor permeation of about 0.025 gm H_2O/day/100 in^2, or less.

3. The balloon assemblies claimed in claim **2** wherein said polymeric film is a polyethylene film having a thickness of at least 2 mils.

4. The plurality of balloon assemblies claimed in claim **1** wherein said balloons are 11-inch balloons and contain 2 to 10 ml of coating composition.

5. The plurality of balloon assembly claimed in claim **1** wherein said balloons are 9-inch balloons and contain 1-4 ml of said coating composition.

6. An uninflated toy balloon having a maximum inflated dimension of 9-11 inches containing a coating solution comprising water, PVOH and a water soluble carbohydrate, said composition comprising 3-20% PVOH and 1 to 35% carbohydrate;

a one-way valve attached to a neck of said balloon;

said balloon having a coating amount of 0.0006 to 0.0021 ml/cm^2 of maximum inflated surface area.

7. The balloon claimed in claim **6** having a maximum inflated diameter of 500% of an uninflated diameter.

8. The balloon claimed in claim **6** wherein said one-way valve includes an inlet tube sealed at one end and having a hole through a side wall of said tube and an expandable collar surrounding said side wall and sealing said tube.

9. The balloon claimed in claim **6** wherein said composition comprises about 11% PVOH.

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