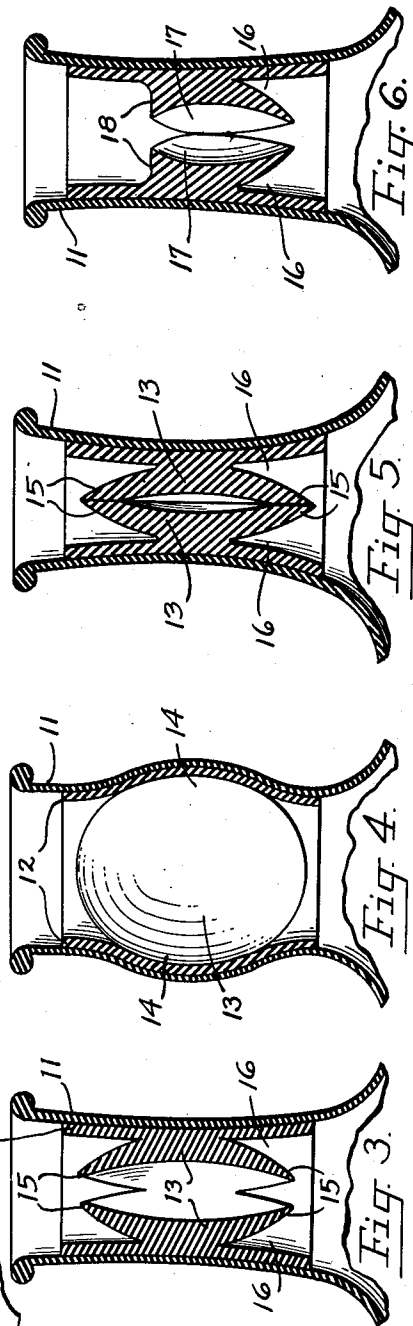
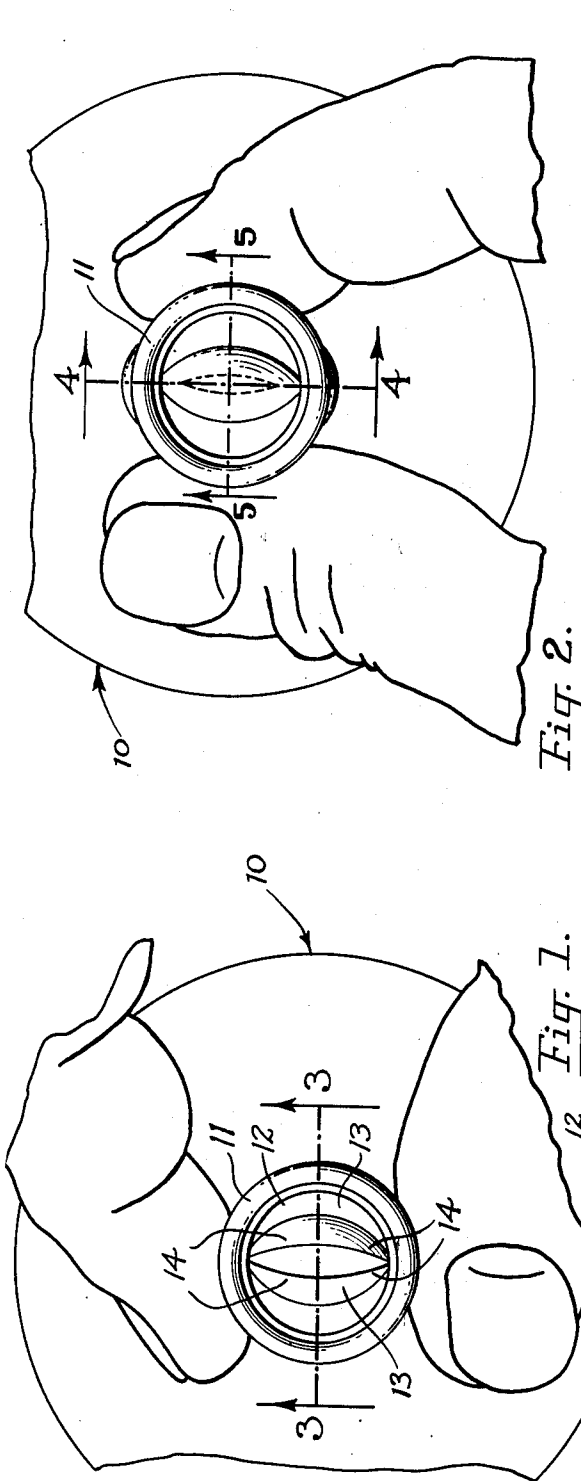


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INFLATION TUBE VALVE
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INFLATION TUBE VALVE

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My invention relates to a resilient non-metallic valve for use in combination with any of a wide variety of inflatable articles such as toy balloons and animals, air mattresses, children's plastic play pools, and the bladders of footballs, basketballs, and the like.

One object of my invention is to provide a valve of this type which is operable quickly, yet only with a conscious effort, between an open and a closed position by manipulation with the thumb and forefinger of one hand whereby breath inflated articles such as toy balloons and the like may be filled by a series of breaths without loss of pressure intermediate each breath.

There are on the market at the present time a large number of inflatable articles such as air mattresses, toy animals and the like, which conventionally are inflated with a series of breaths from the mouth. It is in conjunction with these articles that my invention is of particular utility and is an improvement over previously known inflation control devices.

Many breath inflated articles are sealed against leakage by folding the inflation tube or stem and, thereafter, by binding the stem with a rubber band. Other articles, such as toy balloons, are sealed by tying a knot in the stem. Still others employ either a metal inflation tube which has external screw threads for the accommodation of a screw cap closure or a hard rubber tube which is tapered to receive a force fit closure pin. Experience has shown, however, that each and every one of these closures is possessed of certain inherent disadvantages and one object of my invention is to improve upon these closures and eliminate the disadvantages thereof. By way of example, both the well-known inflatable plastic play pool for children and the inflatable air mattress for open air camping employ metal inflation tubes. During use, however, the plastic play pool is subject to the deleterious effect of repeated splashes of water and sudden internal pressure strains as the children play therein. Similarly, the air mattress is subject both to sudden strains and to moisture condensation on cool nights. The inflation tubes of both these articles, on the other hand, are prone to pick up saliva moisture during inflation. As is well known, moisture originating from any of these sources will corrode and rust metal parts and, eventually, may cause such parts to function imperfectly. Accordingly, it is a prime object of my invention not only to provide a closure valve for these articles which is non-metallic throughout, but also to provide a valve which

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functions better and more efficiently when wet than when dry. In this manner, the entrance of saliva and other moisture into the operating parts of the closure will prove a boon rather than a hindrance to the efficient operation thereof.

Continuing with the disadvantages of those inflatable article closures heretofore employed, experience has shown that the act of inflation, by mouth, is difficult to control. For example, when an air mattress or a toy animal is inflated, the tube or spout which opens to the inflation chamber must be covered or sealed between each of the series of breaths. In practice, this is accomplished either by putting the tip of the tongue over the end of the tube or by pinching or holding the tube with the fingers. I feel that these procedures are unsatisfactory, however, since some of the pressure invariably is allowed to leak out. With my invention, on the other hand, exit of air through the tube is controlled with a valve which is operable, with the forefinger and thumb of one hand only, between an open inflation position and a closed sealing position. Further, this valve may be manipulated quickly and with a minimal effort to the open position while the article is being inflated and to the closed position while another breath is taken. In this manner, no air need be lost between breaths and the article more quickly and with less effort can be inflated.

In summary, my valve is provided with a resilient and elongated hollow bored tube which is joined at one end to an inflatable article. Within the hollow bore of the tube, a pair of resilient concave suction cups are mounted. These suction cups are movable laterally away from one another to expose an open passage through the hollow bore of the tube and are collapsible laterally against one another to close this passage and prevent flow through the tube. Accordingly, the entire valve is non-metallic, the parts being formed of rubber or a resilient and flexible plastic, and ready control of flow through the valve may be had merely by manipulating the fingers of one hand either to spread or to collapse the suction cups.

As a further novel feature of my invention, the suction cups above described are provided with mated recess means which extend between the walls of the tube and the back of the suction cups to define complementary pressure pockets. These pressure pockets are located immediately adjacent the inflation chamber of the inflatable article so as to press the lips or peripheral margins of the suction cups together more tightly

when the pressure is increased within the article. In effect then the pressure pockets serve to increase the compressive closure force across the suction cups directly in proportion to that pressure which exists within the inflatable article. In conjunction with a play pool or air mattress, for example, the greater the pressure within the article, the more force which automatically is applied to the valve to maintain the closed position. This factor alone is a decided improvement over most closures now in common use.

A further object of my invention is to provide, in combination with an inflatable article having a hollow inflation chamber, a non-metallic valve which selectively will control the inflation of and retain the pressure within the hollow chamber and will be sealed more tightly in a closed position as the pressure within the hollow chamber is increased.

Yet another object of my invention is to combine a pair of mated concave suction cups with a resilient hollow tube in order that collapse of the suction cups in face to face abutment hermetically will seal the hollow tube and will, by means of the vacuum type suction between the cups, retain this seal indefinitely.

These and other objects, capabilities, and advantages of my invention will be set forth in the following detailed description, taken with reference to the accompanying drawing, wherein:

Fig. 1 is a top view of an inflatable article such as a toy balloon with the resilient valve of my invention controlling the inflation tube thereof, the valve being shown in the open position;

Fig. 2 is a top view similar to Fig. 1 but showing the valve in the closed position with the suction cups collapsed;

Fig. 3 is a partial cross section view, taken substantially on the line 3—3 of Fig. 1, showing the suction cups laterally spaced one from another to define the open position of the valve;

Figs. 4 and 5 are related sectional details, taken substantially on the lines 4—4 and 5—5, respectively, of Fig. 2, showing the disposition of the suction cups when the valve is in a closed position; and

Fig. 6 is a sectional detail similar to Fig. 3 but showing a second species of my invention wherein the top margins of the suction cups merge laterally with the walls of the valve body rather than being spaced therefrom.

The valve of the instant invention preferably is molded, as by injection molding, from a flexible thermo-plastic resin or from rubber either as a separate valve later to be attached to an inflatable article or as an integral part of an article molded from the same material. In the drawings, I have shown a typical inflatable article which may be a balloon 10 having an encompassing envelope which bounds a hollow inflation chamber. As is conventional, the envelope is provided with a hollow protuberant snout 11 for purposes of inflation. In conjunction therewith, I provide a novel control valve which is formed complementary to the hollow snout in order frictionally to fit and to be retained therein as shown in the drawing. Thus, in the absence of excessive internal pressures, no glue or other fastening means need be employed to retain the valve within the inflation snout of the article.

In detail, the body of my novel valve is defined by an elongated, hollow bored cylindrical tube having a resilient and flexible bounding wall member 12. In the first species of my invention (see Figs. 3 to 5), the valve itself is symmetrically

placed with respect to this valve body so assembly thereof within the hollow snout 11 may be effected with either end up.

Within the hollow bore of the valve body 12, a mated pair of collapsible concave suction cups 13 are secured in contiguous face to face relationship. These suction cups are carried medial the ends of the elongated body 12 and have their lateral peripheral margins 14 arranged in sealed abutment with one another and with the wall 12. On the other hand, the end peripheral margins 15 of the suction cups either normally are spaced a slight distance or are movable laterally apart under a slight pressure to define an open passageway as shown in Figs. 1 and 3. Thus, when the valve is assembled within the inflation tube of the inflatable article, no flow can take place to or from the article around the suction cups. Instead, such flow must take place, if at all, across and between the mated concave faces of the suction cups as shown in Figs. 1 and 3. Actually, of course, it is of little consequence to the control of this flow whether the spacing of the suction cups in the open position of the valve is due to the inherent elasticity of the wall member 12 or to the natural relaxed form of the suction cups 13. Accordingly, both constructions are within the scope of my invention.

Turning now to Figs. 3 and 5, it will be seen that the end peripheral margins 15 are spaced laterally from the resilient wall members 12 in order to define a recess means or pressure pocket 16 intermediate the back of each suction cup and the wall. In use, these recesses or pressure pockets 16 function to maintain the valve in the closed position once the suction cups have been collapsed. Thus, referring to Fig. 5, the two suction cups 13 have been collapsed in face to face abutment by the application of a compressive squeeze adjacent the joinder point of the wall and the suction cups. This squeeze creates a partial vacuum between the faces of the suction cups, as is conventional with these cups, and atmospheric pressure thereafter maintains the seal by pressing in upon the back of each cup. At this point, the pressure pockets 16 come into play. Accordingly, if the article is inflated to a substantial pressure which is greater than atmospheric, an additional closure force will help hold the cups together. This additional force acts upon the inner end peripheral margins of the suction cups via the pressure pockets 16 to help maintain the closed position of the valve. Thus, the compressive closure force directly is proportional to the pressure which exists within the inflatable article and the greater this pressure, the greater the tendency of the bottom margins to be forced against one another to maintain the closed position of the valve. With toys, air mattresses, and other inflatable articles subject to sudden strains and blows, this factor is of increased importance.

In Figs. 1 to 5, I have illustrated a valve having resilient concave suction cups with pressure pockets behind both ends thereof. In Fig. 6, on the other hand, a somewhat different disposition of the two suction cups 17 is shown. Thus, these latter cups also are provided with pressure pockets 16 behind the lower peripheral margins thereof but the upper peripheral margins have been laterally extended and merged with the wall member 12, as indicated at 18, to provide a smooth joinder surface. This elimination of the upper recesses or pressure pockets 16 has been effected so that dirt, moisture, and the like will

not collect about these portions of the valve. Accordingly, the selection of one species in preference to another will depend to a certain extent upon the use to which the valve and inflatable article are to be put.

In use, it will be realized that the suction cups 13 and 17 are of conventional structure in that they are provided with concave faces which, when collapsed against one another, squeeze the air from intermediate the faces. With the air thus eliminated, atmospheric pressure acts upon the rear or back faces of the suction cups and maintains the abutment in opposition to the inherent elasticity of the cups. Accordingly, it is evident both from the nature of the suction cups and from experience, that they will stick together for a longer period of time when the surfaces and margins are somewhat damp. On the other hand, it is as equally well known that when an inflatable article is blown up with a series of breaths, saliva collects upon the valve parts. With the valve of the instant invention, this saliva and moisture is an aid to the efficient function of the valve whereas, with the metal valves heretofore in common use, such saliva was a disadvantage since it corroded the parts.

In Fig. 1, I have shown the thumb and forefinger of a hand as they grasp the sides of the valve body to effect the open position of the suction cups. In Fig. 2, on the other hand, the thumb and forefinger are gripping the hollow snout 11, and thus the valve body, to bear upon the backs of the two suction cups 13 in order to close the valve. In practice, the collapse of the suction cups into face to face relationship requires a conscious effort in that a compressive squeeze must be applied with sufficient force to overcome the inherent resiliency of the suction cups. In similar manner, once the valve is closed, a conscious effort and a compressive squeeze must be applied to break the vacuum between the suction cups and to open the valve. Also, it must be remembered that the force which maintains the valve closed directly is proportional to the pressure existing within the hollow inflated article. Accordingly, if a toy, air mattress, or the like is inflated to a substantial pressure, a substantial compressive squeeze must be exerted, in the direction shown in Fig. 1, in order to break the seal of the suction cups and open the valve.

In summary, I have provided a resilient non-metallic valve for use with an inflatable article. This valve is capable of rapid and accurate manipulation from an open to a closed and from a closed to an open position with the thumb and forefinger of but one hand. Further, the area encompassed in the open position of the valve may be adjusted by squeezing the body of the valve to a greater or lesser extent. In addition, the valve ideally is suited for inflatable toys, air mattresses, and miniature play pools since moisture enhances rather than hinders the operation of the valve and the closed position of the valve is aided rather than hindered by an increase in pressure within the inflatable article. Other advantages, such as simplicity of construction and operation and a minimal fabrication cost, also will be evident from the above detailed description and will be recognized as improvements over the closure controls now in use with inflatable articles.

I claim:

1. In combination with an inflatable article carrying a hollow protuberant snout for inflation

purposes, a resilient hollow bored tube complementary to and frictionally retained within said hollow snout, said hollow tube having a pair of resilient concave suction cups mounted in contiguous mated normally spaced relationship within the hollow bore thereof, the lateral peripheral margins of said suction cups being in registration with one another and integral with the hollow bore of said tube, the other peripheral margins of said suction cups being laterally separable to a spaced relationship, said suction cups being collapsible into face to face abutment to close said hollow bore.

2. A valve for an inflatable article, comprising a resilient hollow bored tube joined at one end to an inflatable article, said hollow tube being open at both ends and having a mated pair of resilient suction cups mounted within the hollow bore thereof and intermediate the ends thereof, the end peripheral margins of said suction cups normally separated laterally from one another to define an open passageway intermediate the cups, said suction cups and the end peripheral margins thereof being collapsible into direct abutment with one another to define a closed position sealing said passageway.

3. A valve for an inflatable article, comprising an elongated tubular body having a hollow bore bounded by a resilient wall member, a pair of collapsible concave suction cups secured in face to face relationship to opposite sides of said resilient wall member within said hollow bore, said suction cups being carried intermediate the ends of said elongated tubular body and having the lateral peripheral margins thereof arranged in sealed abutment, the end peripheral margins of said suction cups being normally separated laterally from one another to define an open position of the valve, the peripheral margins of said suction cups adjacent at least one end of the tubular body having mated recess means extending therebehind to define circular complementary pressure pockets.

4. A valve for an inflatable article, comprising an elongated tubular body having a hollow bore extending therethrough and bounded by a resilient wall member, a pair of resilient and collapsible concave suction cups secured in face to face relationship to opposite sides of said resilient wall member within said hollow bore, said suction cups being carried intermediate the ends of said elongated tubular body and having the lateral peripheral margins thereof arranged in sealed abutment, the end peripheral margins of said suction cups being normally separated laterally from one another, said suction cups being collapsible into direct face to face abutment to define a closed position of the valve, the peripheral margins of said suction cups adjacent one end of the tubular body having mated recess means extending therebehind to define circular complementary pressure pockets, and the peripheral margins of said suction cups adjacent the other end of the tubular body extending laterally toward and merging with said wall.

5. In combination with a resilient tube having a hollow bore, a valve for controlling flow therethrough, said valve including a mated pair of resilient concave suction cup means mounted in spaced contiguous face to face relationship within the hollow bore of said tube and sealingly joined along a portion of the backs and sides thereof to said tube, said suction cups being normally spaced laterally from one another to define an open passage intermediate the faces there-

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of and being collapsible laterally against one another to close said passage and prevent flow through said tube.

6. A non-metallic valve movable between an open and a closed position, said valve including an elongated, cylindrical tube having a hollow bore and a resilient wall member bounding the hollow bore thereof and defining the body of said valve, a mated pair of collapsible concave suction cups secured in normally spaced contiguous face to face relationship to the opposite sides of said wall member within said hollow bore, said suction cups having the lateral peripheral margins thereof arranged in sealed abutment with said wall member, the end peripheral margins of said suction cups being normally spaced laterally from one another, and closable in suction grip with each other by externally applied digital pressure applied to move said suction cups tightly against each other and to flex their peripheral margins.

7. In combination with an inflatable article having an encompassing envelope bounding a hollow inflation chamber, an opening piercing said envelope and communicating with said hollow chamber, a non-metallic valve means secured within said opening and movable between an open and a closed position selectively to control the inflation of and the retention of pressure within said hollow chamber, said valve means including an elongated, cylindrical tube having a hollow bore and a resilient wall member bounding the hollow bore thereof and defining the body of said valve, said elongated tube having an inner end and an outer end, a mated pair of collapsible concave suction cups secured in normally spaced contiguous face to face relationship to the opposite sides of said wall member within said hollow bore, the peripheral margins of said suction cups adjacent the inner end of said hollow tube each having a recess means extending longitudinally therebehind intermediate the back of the cup and the wall member, the peripheral margins of said suction cups adjacent the outer end of said hollow tube each being joined laterally with and merging into said wall member.

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8. In combination with an inflatable article having an encompassing envelope bounding a hollow inflation chamber, an opening piercing said envelope and communicating with said hollow chamber, a non-metallic valve means secured within said opening and movable between an open and a closed position selectively to control the inflation of and the retention of pressure within said hollow chamber, said valve means including an elongated, hollow bored cylindrical tube having a resilient and flexible wall member bounding the hollow bore thereof and defining the body of said valve, a mated pair of collapsible concave suction cups secured in normally spaced contiguous face to face relationship to the opposite sides of said wall member within said hollow bore, said suction cups being carried intermediate the ends of said elongated tube and having the peripheral margins thereof arranged to be flexed into sealed abutment with one another and being integral with said wall member, the end peripheral margins of said suction cups being movable laterally away from one another after they have been flexed and arranged in sealed abutment by a compressive squeeze applied to said lateral peripheral margins thereby to define said normal open position, said closed position being concordant with the collapse of said suction cups by a compressive squeeze applied to said wall member adjacent the joinder points of the wall and suction cups, the peripheral margins of said suction cups adjacent the inner end of said hollow tube each having a recess means extending longitudinally therebehind intermediate the back of the cup and the wall member to increase the compressive closure force across the two cups directly in proportion to the pressure existing within said hollow inflation chamber.

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