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[54] **MEANS FOR REJUVENATING TENNIS BALLS AND THE LIKE**

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[51] **Int. Cl.**[2] **B65B 3/10**

[58] **Field of Search** 141/3, 19, 20, 38, 329, 141/330; 239/308, 573

[56] **References Cited**

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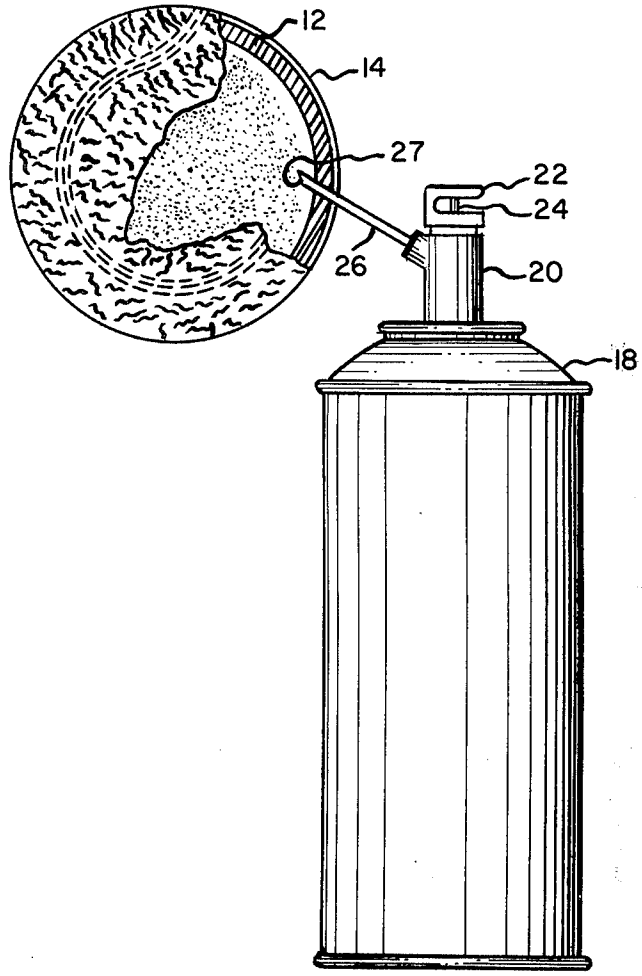
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Attorney, Agent, or Firm—Limbach, Limbach & Sutton

[57] **ABSTRACT**

To rejuvenate a hollow elastic ball such as a tennis ball, an aerosol comprising a mixture of a carrier gas and a sealant is injected within the interior of a tennis ball to repressurize the ball and to seal any leaks in the ball.

3 Claims, 4 Drawing Figures



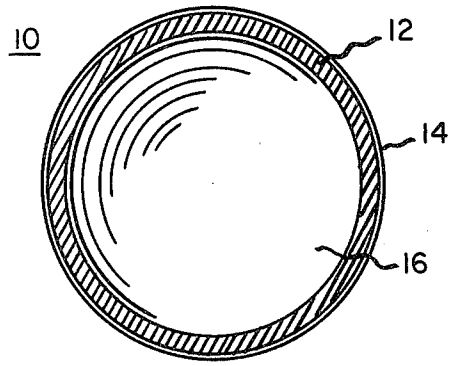


FIG. 1

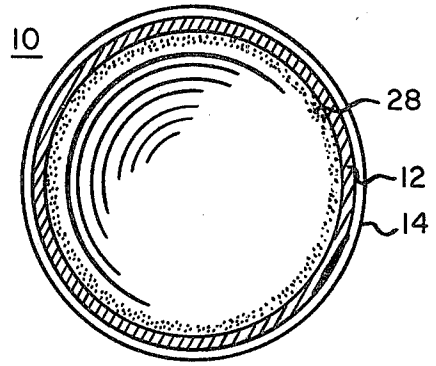


FIG. 3

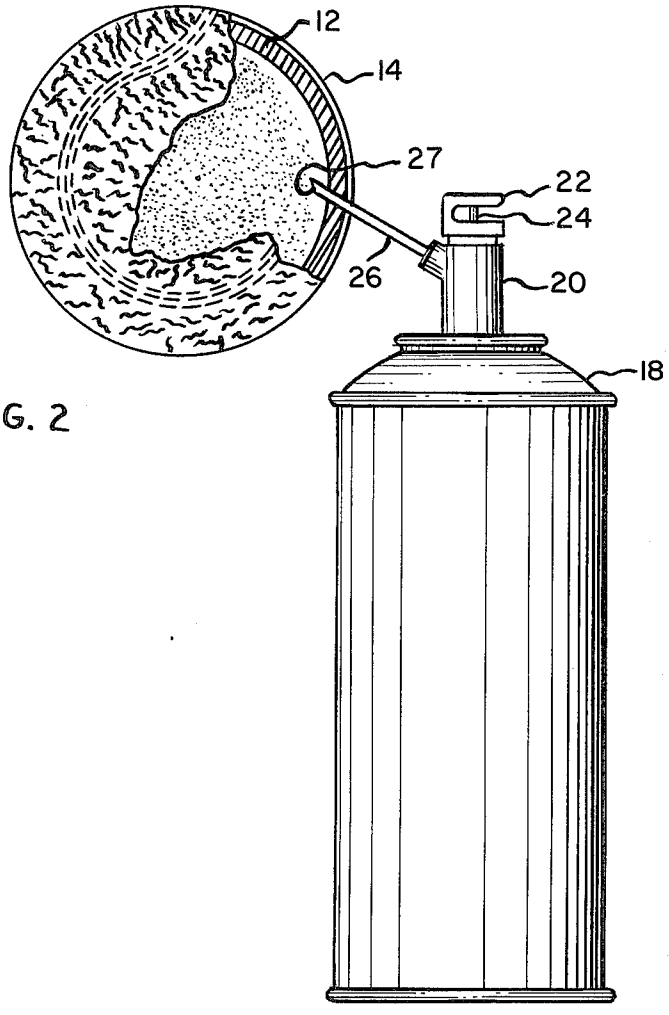


FIG. 2

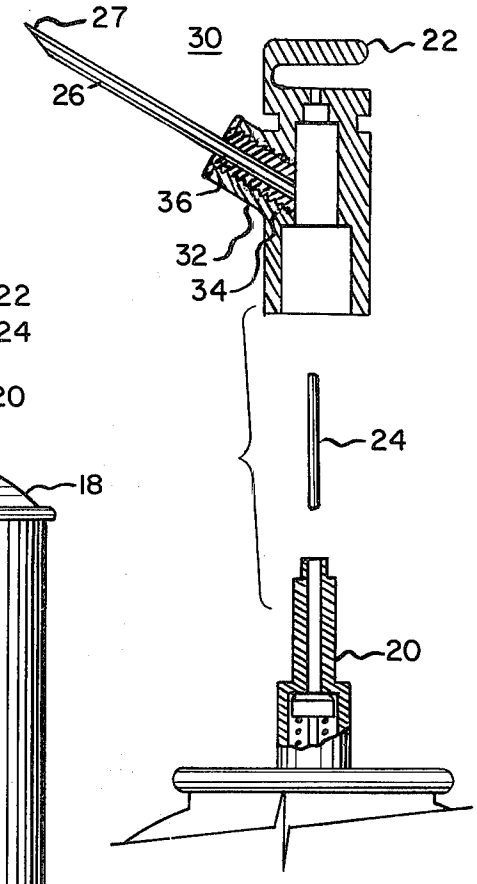


FIG. 4

MEANS FOR REJUVENATING TENNIS BALLS AND THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to rejuvenating elastic hollow balls such as tennis balls and more particularly to rejuvenating balls which have become depressurized through use or through leaks therein.

As is well known, a tennis ball is elastic due to the rubber material forming the tennis ball's sphere and because the air contained within the tennis ball is at a positive pressure. By positive pressure it is meant that the pressure is greater than atmospheric pressure, i.e. greater than 14.7 p.s.i. at sea level. The positive pressure is necessary in order that the tennis ball have the desired amount of "bounce" or rebound when dropped a predetermined distance to a hard, playing surface.

When purchased new, a tennis ball normally has the correct positive pressure due to the fact that it is pressurized at the factory and sold in sealed pressurized cans to protect it against loss of pressure. However, once the container is opened and a tennis ball is used, it slowly, and sometimes not so slowly, begins to lose its life and go "dead." This is largely due to the loss of pressure within the tennis ball due to minute leaks through the tennis ball wall. The exposure to atmospheric pressure and being hit by tennis rackets in play accelerate this process.

Various techniques in the past have been used to rejuvenate tennis balls once they have become "dead." In one approach, the tennis balls when not in use are stored within a special pressurized container in order that the pressure will be restored within the tennis balls through the very leaks in the ball by which the air escaped in the first place. Not only does this require a lot of time, but the leaks still remain and hence the balls will lose their positive air pressure eventually and the tennis balls must be repressurized over and over.

Another approach has been to provide tennis balls during manufacture with a plug of a tacky or sealing material on the inner wall of the ball. A hypodermic needle is used to puncture the ball where the sealant is located and air is pumped into the ball. The sealant seals the hole made by the needle. However, the tacky plug renders the ball heavier on one side than on the other which causes it to wobble during its flight. And while the sealant prevents air from leaking through the hole made by the needle, the repressurized ball will eventually depressurize again through the leaks in the remaining part of the ball. Also, this approach requires the ball to be manufactured with the sealant inside and is of no help to the person who wants to rejuvenate an ordinary tennis ball.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide an improved means and method for rejuvenating an elastic hollow ball such as a tennis ball.

Another object of the invention is to provide improved tennis ball rejuvenating means which is portable and which can be used to rejuvenate tennis balls of ordinary construction.

Another object of the invention is to provide improved means for repressurizing a ball such as a tennis ball and thereafter maintaining it pressurized.

Another object of the invention is to provide means for repressurizing a tennis ball without rendering the same in an unbalanced state.

Another object of the invention is to provide improved means for rejuvenating a tennis ball which is both inexpensive and not time consuming.

In accordance with the present invention, a hollow elastic ball such as a tennis ball, is injected with an aerosol or mixture comprising a pressurizing gas and a sealant suspended therein. The pressurizing gas acts to repressurize the tennis ball as well as to carry the sealant within the interior of the tennis ball. Once the aerosol is within the tennis ball, the sealant, which dries on contact with air, seals any leaks through the sphere forming the tennis ball.

In the preferred embodiment, the pressurizing gas is stored, as a liquid, in an aerosol can. The sealant is also contained within the aerosol can. The liquid such as freon is chosen so that its boiling point is sufficiently low that when it is exposed to atmospheric pressure it quickly is converted from a liquid to a gas. This technique is well known and is the basic principle of the operation of the aerosol spray container.

The sealant is also contained within the sealed container and when the aerosol container is exposed to atmospheric pressures, the pressurizing liquid vaporizes. In the vaporized form the pressurizing gas forms an aerosol with the sealant as it is expelled from the container. A hollow needle is provided as a conduit for conveying the resulting aerosol comprising the carrier gas and the sealant within the tennis ball. The needle is provided with a sharp point to enable penetration thereof within the tennis ball. The pressurizing gas thus serves two purposes: to reinflate or repressurize the ball and to act as a carrier for the sealant.

When the needle is removed the sealant within the tennis ball quickly seals up the hole created by the needle. It also seals up any other leaks in the tennis ball. It accomplishes this without upsetting the balance of the tennis ball and it does it quickly and easily.

The present invention is particularly suitable for rejuvenating tennis balls. However, the present invention is also useful for rejuvenating other elastic, hollow balls such as a ball used for handball.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional view of a "dead" tennis ball.

FIG. **2** is a diagrammatic illustration partially in section, of a tennis ball after being injected with an aerosol containing a pressurizing gas and a sealant in accordance with the present invention.

FIG. **3** is a cross-sectional view of a tennis ball after the sealant has dried within the tennis ball.

FIG. **4** is a cross-sectional view of a portion of the aerosol container of FIG. **2** provided with a hollow needle for piercing the tennis ball.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** is a cross-sectional view of a tennis ball **10** which is "dead," which includes an elastic hollow rubber sphere **12** surrounded by a fibrous nap **14** forming the outer surface of the ball. By "dead" it is meant that the interior **16** of the ball has lost its positive pressure. A ball in the condition of tennis ball **10** of FIG. **1** is of little value on a tennis court. The bounce and rebound is below that which is acceptable for play.

In FIG. 2 the tennis ball **10** is shown being injected with a mixture or aerosol of a sealant and a pressurizing or carrier gas. A sealed aerosol container **18** contains a mixture of a liquid such as freon and a sealant such as a liquid rubber cement compound.

Aerosol container **18** is conventional in design and operation. A valve assembly **20** is operated by the user in a conventional manner. When the user depresses the button **22** a small shaft **24** opens the valve **20** to expose the contents of the container **18** to atmospheric pressure. When this happens, the liquid pressurizer is rapidly converted into a gas at a comparatively high pressure.

The pressurizing gas is used as a vehicle thereafter to carry the liquid rubber cement out of the pressurized can **18** through a hollow needle **26** and into the interior of the tennis ball **10.** The needle **26** is provided with a sharpened end **27** to facilitate penetration of the needle through the rubber wall **12** of the tennis ball. Besides being a vehicle for transporting the liquid sealant, the pressurizing gas acts to reinflate the interior of the tennis ball **10.**

In FIG. 3 the sealant is shown as a thin layer **28** adhering to the inside wall of the tennis ball surface **12** after drying time has elapsed. If a hole exists through the rubber wall **12** of the tennis ball, the sealant seals the hole immediately. The sealant **28** seals both the hole made by the needle **26** after it is removed as well as any other holes in the tennis ball. Since the sealant is evenly distributed around the interior of the tennis ball wall **12,** the ball is not unbalanced due to its presence. Additionally, the amount of the sealant is sufficiently small that the weight of the tennis ball is not increased substantially and in fact, the additional weight of the sealant to the ball acts to offset the weight lost as the nap **14** wears off the tennis ball.

FIG. 4 shows the construction of the head assembly **30** of the aerosol can **18.** The head assembly **30** is made of a plastic, typically polyethylene. The valve assembly **20** is shown in an exploded view for clarity and fits within the head assembly **30** as indicated. Outlet appendage **32** is threaded at **34** and then is filled with an epoxy **36** through which the hollow needle **26** is provided. The threads provide a surface on the polyethylene body to which the epoxy can adhere. A knurl is machined on the end of the needle **26** which is embedded in the epoxy **36** to aid in the adhesion of the needle.

Once it hardens, the epoxy holds the needle **26** to the head assembly **30.** In one particular embodiment the thread **34** is a **4-40** UNC and the needle **26** comprises a stainless steel hypo tube with an outside diameter of 0.028 inch and an inside diameter of 0.016 inch.

In operation, the sealed container **18** is shaken vigorously before using. The tennis ball is held firmly in one hand and the pressurized container **18** in the other. The end of the needle **27** is pressed against the seam of the tennis ball **10** until the needle **26** penetrates the ball **10.**

The aerosol mixture is introduced within the tennis ball by depressing the button **22** for approximately one to two seconds. The time elapsed during the injection of the aerosol within the tennis ball is important to the performance of the tennis ball. It has been found that a one-to-two second injection time is ideal for a container **18** filled with 7 ¾ fluid ounces of liquid pressurizer and a liquid cement sealant.

By injecting the ball with the aerosol for this period of time at room temperature the tennis ball is restored to approximately the same pressure as when the ball was purchased and the bounce and rebound is therefore restored. Also, the sealant blocks up the holes which caused the ball to be depressurized in the first place and so the rejuvenated ball of FIG. 3 remains in its restored condition for long periods of time.

It has been found that with the aerosol container described above, that up to 65 to 75 tennis balls can be rejuvenated with one can containing 7 ¾ fluid ounces of the pressurizer/sealant mixture.

Any rubber cement compound which adheres to rubber and which dries in air can be used. In one actual embodiment, the container **18** was purchased with a mixture of a sealant and a pressurizer from 3M Corp., St. Paul, Minnesota, Model No. 6092 and called by the name "Photomount Adhesive."

In the embodiment described the aerosol spray can technique is used to inject the pressurizing gas/sealant mixture within the ball. However, the invention should not be so limited to this particular injecting means. For example, the familiar hand-pumped spray applicators, having a reservoir of a liquid sealant, could be used in place of the aerosol spray can to form the pressurizing gas/sealant aerosol.

What is claimed is:

1. Apparatus for pressurizing and maintaining the air pressure within the interior of a tennis ball comprising:

a. a sealed container;

b. a sealant contained within said container;

c. a liquid contained within said container which when exposed to reduced pressures is converted into a pressurized gaseous state;

d. means for creating an aerosol composed of said gas and said sealant, said means including a valve assembly forming a part of said container for lowering the pressure within said container to cause said liquid to convert into the pressurized gaseous state;

e. a conduit forming a part of said container for providing an outlet for said aerosol, said conduit having a sharpened tip to enable penetration thereof within the interior of a tennis ball to enable the aerosol to enter within the tennis ball to increase the pressure therein, and whereby said sealant acts to seal both the hole caused by said tip when removed as well as other holes in the tennis ball walls.

2. Apparatus as in claim **1** wherein said narrow conduit is a hollow needle.

3. Apparatus as in claim **1** wherein said sealant comprises a liquid rubber cement compound.

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