Aug. 7, 1934. M. M. HARRISON 1,969,128

INFLATED BALL AND METHOD OF MAKING SAME

Filed Aug. 23, 1933

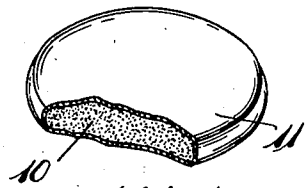


Fig. 1.

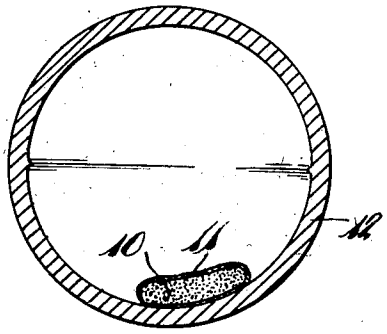


Fig. 2.

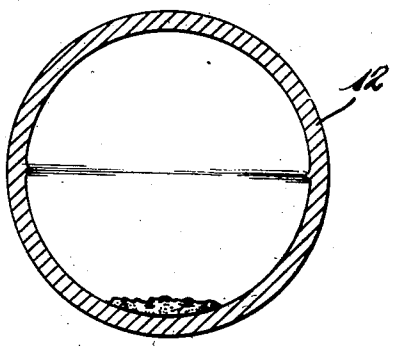


Fig. 3.

Inventor,
Marion M. Harrison.
By Eakin & Avery
Attys

Patented Aug. 7, 1934

1,969,128

UNITED STATES PATENT OFFICE

1,969,128

INFLATED BALL AND METHOD OF MAKING SAME

Marion M. Harrison, Akron, Ohio, assignor to The B. F. Goodrich Company, New York, N. Y., a corporation of New York

Application August 23, 1933, Serial No. 686,377

6 Claims. (Cl. 154—16)

This invention relates to inflated rubber balls.

It is customary to manufacture such balls by uniting a plurality of pieces of sheet rubber to form a closed biscuit, a blower or mixture of chemicals being enclosed to provide pressure within the article during the molding thereof. Under the influence of heat applied to the mold in which the biscuit is enclosed during vulcanization, reaction of the chemicals liberates gases which fill the ball. These gases may be effective to inflate the ball only during vulcanization, as when ammonium carbonate and water are used, or they may serve permanently to inflate the ball, as where mixtures of ammonium chloride and sodium nitrite are employed.

It has been found that while the rate of diffusion of gases differs and that a gas such as nitrogen which has a slow rate of diffusion and does not react with vulcanized rubber advantageously may be employed, slow diffusion of the gas eventually occurs with resulting decrease in the inflation pressure of the ball.

As balls which become soft in stock due to loss of gas must be reinflated, it has been the practice to provide such balls, during manufacture, with a button of unvulcanizable rubber of a tacky nature fixed to the inner wall of the ball through which the ball could be reinflated with a hypodermic needle. Such buttons throw the ball off balance and the operation of reinflating is difficult and expensive.

The principal objects of this invention are to provide for delayed generation of gas in the finished ball to compensate for diffusion and to eliminate needle inflation.

Other objects will appear from the following description and the accompanying drawing.

Of the drawing:

Fig. 1 is a perspective view of a capsule containing a gas generating chemical, part being broken away.

Fig. 2 is a cross sectional view of an inflated ball with such a capsule contained therein.

Fig. 3 is a similar view showing the capsule as partly disintegrated.

Referring to the drawing, in proceeding according to the invention a quantity of gas-forming chemical 10 such as sodium nitrite, is first enclosed in a capsule 11 made preferably by die-cutting thin sheets of rubber together around the chemical. The capsule is made of such material as to be subject to rapid deterioration, either by disintegration of the rubber or by failure of the seam.

The capsule is enclosed in a biscuit formed of seamed sheets of unvulcanized rubber together with unenclosed gas forming chemicals, such as a mixture of sodium nitrite and ammonium chloride, capable of reacting during vulcanization of the ball to release a gas. An excess of ammonium chloride sufficient to react later with the enclosed sodium nitrite is also enclosed in the biscuit, or where other materials capable of reacting later to release a gas are used a quantity of one of the chemicals is placed in the unvulcanized ball enclosed in a capsule and the other enclosed in the biscuit without the capsule.

The biscuit is enclosed in a mold and subjected to heat. The ball 12 becomes fully inflated in the mold by reaction of the free chemicals. Where as an example sodium nitrite and ammonium chloride are used the reaction is according to the following formula:

$$NaNO_2+NH_4Cl=2N+NaCl+2H_2O$$

The remaining ammonium chloride remains intact. After vulcanization of the article the capsule 11 gradually becomes deteriorated, releasing the sodium nitrite. The sodium nitrite released combines with the remaining ammonium chloride at room temperatures thereby releasing gas at a rate comparable to the rate of diffusion through the walls of the ball. The ball may be heated to accelerate the evolution of gas.

In order to provide for early disintegration of the capsule it preferably is vulcanized with sulfur chloride and the rubber of which it is made may be compounded with copper salts such as copper chloride or other materials tending to shorten its life. It has been found that a solution of a copper salt dropped on a capsule before it is used will greatly accelerate disintegration of the capsule.

While sodium nitrite and ammonium chloride are mentioned as suitable chemicals to provide the evolution of gas, it is evident that other chemicals can be used with the invention and that these are only illustrative.

I claim:

1. An inflated rubber ball comprising a continuous spherical wall and enclosed thereby a capsule made of material subject to early deterioration, said capsule containing a gas forming chemical, said wall enclosing outside the capsule a chemical adapted to react with the chemical in the capsule when released by disintegration thereof to release a gas to compensate for diffusion of gas through said wall.

2. An inflated rubber ball comprising a continuous spherical wall and enclosed thereby a

capsule containing a gas forming chemical, a second chemical adapted to react with the first-named chemical to liberate a gas and enclosed within the wall of the ball without the capsule, and means associated with the capsule to accelerate early deterioration thereof.

3. An inflated rubber ball comprising a continuous spherical wall and enclosed thereby a capsule containing a gas forming chemical, and a second chemical adapted to react with the first named chemical to liberate a gas and enclosed within the wall of the ball without the capsule, said capsule being treated to accelerate deterioration thereof.

4. The method of making an inflated rubber ball which comprises enclosing a gas forming chemical in a capsule adapted to undergo early deterioration, enclosing said capsule and an unenclosed mixture of chemicals adapted to react to release a gas when heated, within a biscuit, enclosing the biscuit in a mold, and vulcanizing the biscuit to form a ball.

5. The method of making an inflated rubber ball which comprises providing molecular proportions of two chemicals adapted to react to release a gas, enclosing a part of one chemical in a capsule adapted to early deterioration, enclosing said capsule and a mixture of the remaining chemicals in a biscuit, and vulcanizing said biscuit under internal pressure provided by reaction of molecular portions of the chemicals outside the capsule.

6. The method of making an inflated rubber ball which comprises providing molecular proportions of two chemicals adapted to react to release a gas, enclosing a part of one chemical in a capsule adapted to early deterioration, enclosing said capsule and the remaining chemicals in a biscuit, vulcanizing said biscuit under pressure provided by reaction of part of the chemicals not enclosed in the capsule, and after vulcanization of the ball and deterioration of the capsule increasing the internal pressure by reaction of the remainder of the chemicals.

MARION M. HARRISON.