Nov. 21, 1944. C. W. GREENE ET AL 2,363,059

CORE FOR GOLF BALLS OR THE LIKE AND METHOD OF MAKING

Filed Oct. 5, 1940

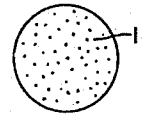


FIG. 1

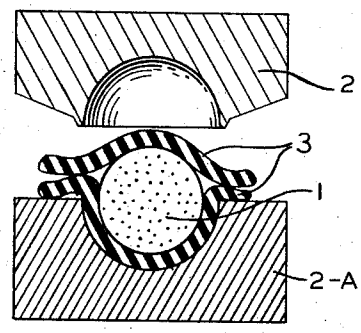


FIG. 2

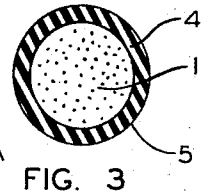


FIG. 3

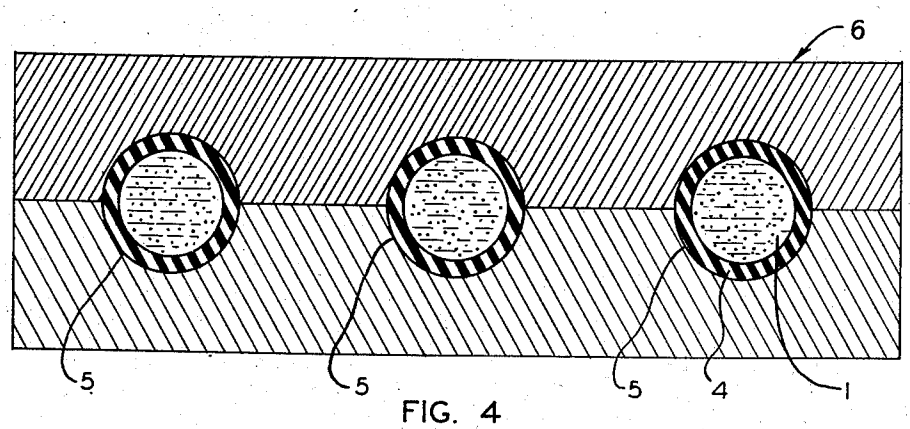


FIG. 4

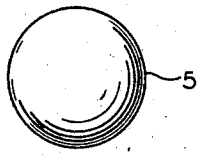


FIG. 5

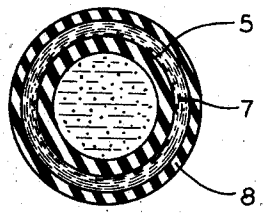


FIG. 6

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Patented Nov. 21, 1944 2,363,059

UNITED STATES PATENT OFFICE

2,363,059

CORE FOR GOLF BALLS OR THE LIKE AND METHOD OF MAKING

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Application October 5, 1940, Serial No. 359,848

5 Claims. (Cl. 154—18)

This invention relates to a method of making mobile cores or centers for golf balls or the like and to cores produced by the method.

A golf ball with a mobile core is generally considered to have greater resiliency than those with solid centers. However, the various methods followed in the past to form mobile cores have been expensive and tedious. Further it has been difficult to produce cores uniform in size and weight as well as cores individually well balanced.

The principal purpose of our invention is to provide an improved method of making cores. This is accomplished as our method simplifies the manufacturing procedure and reduces the cost.

Another important purpose of our invention is the production of cores of a reliable quality. This result is secured through the very accurate control of the core specifications that is possible with this new method.

Our invention utilizes a solid spherical pill as the base for the core. Around this is applied a rubber casing or envelope. During vulcanization of the rubber casing the pill material is rendered permanently liquid or plastic.

In our invention pills of dry material which release water or other liquid when subjected to heat are formed by a standard pill making machine. As such machines are capable of compressing as many as four thousand units an hour, the pills are easily produced at very little expense.

The pills are spherical and their shape and weight are remarkably uniform. Pill producing machines are most commonly utilized for medicinal preparations and for this reason have of necessity been brought to a high degree of accuracy.

The pills may be compressed to an extent where an almost marble-like finish is secured. Such a surface is advantageous as it gives the pill ample strength to withstand subsequent handling.

After the pill is formed it is capped with rubber. This is accomplished by placing it between two rubber sheets which are forced around the pill by two opposing dies having semi-spherical cavities. As they reach closed position the dies shear off the surrounding rubber.

If trouble is encountered from air being caught with the pill within the casing, this air may be effectively withdrawn by piercing the casing with a hypodermic needle and applying suction to the needle. The puncture left by the needle is temporarily self-sealing and is permanently closed by the following vulcanizing operation.

The rubber-capped pill is placed in an ordinary hydraulic press vulcanizing mold where the rubber is vulcanized and the seam at the juncture of the two rubber sheetings is firmly sealed. The heat of vulcanization permanently liquifies the pill material thus providing the mobile center desired. This results from a decomposition brought about by the heat. Water is released by the solid ingredients; the components of the latter then react to form different compounds incapable of reabsorbing or dissolving in the water.

A method of making cores which is somewhat similar to our invention comprises the molding of a hot glue-glycerine mixture into spherical shape and capping the pill thus formed with rubber. This method is more bothersome and expensive than ours because of the work necessary to form the glue-glycerine pills in molds. Further care must be taken to maintain the pills in cold or frozen condition while they are capped. The flowing qualities of this compound are rather limited and the pills are not of a consistent size and weight. The viscosity of our core materal is unaffected by a change in temperature while a glue-glycerine mixture is inclined to thicken as the temperature goes down and to thin out as the temperature rises.

In the accompanying drawing:

Figure 1 is a sectional view of a solid pill of our core material.

Figure 2 is a diagrammatic side elevation in section, of the two opposing dies used to cap the pill with unvulcanized rubber.

Figure 3 is a sectional view showing the capped pill.

Figure 4 is a diagrammatic side elevation in section of the hydraulic vulcanizing press revealing three of the capped pills in vulcanizing position.

Figure 5 is a side elevation of the finished core.

Figure 6 is a sectional view of a golf ball showing the winding and outer cover that are applied over the core.

The ingredients which we prefer to use in compounding the pill are barium hydroxide (caustic baryta), ammonium alum (alumium ammonium sulfate) and stearic acid.

Each molecule of the barium hydroxide carries 8 molecules of water and the ammonium alum molecule has 24 molecules of water associated with it. This is commonly referred to as water of crystallization. If proportioned properly a complete reaction between all of the barium hydroxide and all of the ammonium alum is effected by the heat of vulcanization. The water is released and barium sulfate and hydroxides of aluminum and ammonium are formed. The stearic acid and the newly formed ammonium

hydroxide react to produce ammonium stearate and water.

The newly-formed solid compounds are insoluble. It is ordinarily preferable that any such resultant compounds be insoluble as the reduction in bulk of the pill material attending the formation of a solution would tend to reduce the size of the completed core.

The waxy nature of the stearic acid is believed to facilitate the pill making operation by lubricating the flow of compounding material while the saponaceous stearate is considered a valuable addition to the final mixture. It seems to give the mixture a smoother character and to increase its fluidity.

The chemical transformation brought about by the heat of vulcanization permanently transforms the dry hard pill to a fluid mass. While the solid content is high, the mixture is very mobile and retains complete homogeneity. There is no apparent tendency of the water to separate from the other ingredients. At the same time there is sufficient water to permit freezing of the core as is customary during the subsequent winding operation.

In case it is desired to have less water in the core the pill formula is adjusted. By changing the proportion of the barium hydroxide and the alum from that at which there is a complete reaction, a surplus of one of these materials will be created which will return along with its associated water to its original state when the core is cooled after vulcanization. Thus a certain amount of water will not be permanently released and the final mixture will have that much less liquid.

Another method (and one we believe is superior) of obtaining a different degree of fluidity in the core is the use of a different combination of chemical compounds which however react similarly to furnish a mobile core. For instance aluminum sulfate may be substituted in the formula for the ammonium alum. This will not affect the process other than by slightly changing the character of the final core composition. Similarly, ferrous sulfate may be used in combination with the barium hydroxide.

A pill of the ingredients we have found preferable is prepared by mixing in the usual manner 1262 parts by weight of the caustic baryta, 906 parts of the ammonium alum, and 22 parts of stearic acid. The resulting mixture is put into a hopper feeding the pill making machine. The device is set to produce pills with a diameter of $\frac{13}{16}$ of an inch and weighing 8½ grams.

A pill so produced is illustrated in Figure 1. The pill 1 is placed between two capping dies 2 and 2a which force the rubber sheets 3 (which are approximately ⅛ inch thick) around the pill to constitute the rubber envelope or casing 4. Any air entrapped in the casing may be removed by a hypodermic needle as previously described. The completely formed core 5 is then placed with others in a vulcanizing press mold 6 in which the rubber casing is vulcanized and where the pill is changed from a solid body into a fluid mass. In Figure 6 is shown a section of a golf ball with a layer 7 of the usual rubber ribbon and the standard cover 8 applied over the core 5.

Our invention may be followed in a manner somewhat varied from the preferred form herein described by utilizing the solid pill alone without the rubber envelope as the core. In a golf ball the usual rubber ribbon would be wound directly over the pill which would be liquified later by the heat used to cure the golf ball cover. However, it is not necessary for the subsequent manufacturing process to involve treating the ball with heat as the core material will ordinarily decompose and react under normal temperatures.

There is no intention to limit the scope of the invention to the specific methods and embodiments here described, for the proportions and choice of different ingredients must be arranged throughout a wide range in order to satisfy the demand for balls of varying specifications.

What we claim as new, and desire to secure by Letters Patent, is:

1. The method of making a mobile core for a golf ball or the like which comprises effecting a mixture of a metallic sulfate and a metallic hydroxide, one of which carries water of crystallization, forming the mixture into a solid spherical pill, incasing the pill and heating the incased pill.

2. The method of making a mobile core for a golf ball or the like which comprises effecting a mixture of a sulfate salt carrying water of crystallization and a metallic hydroxide, forming the mixture into a solid spherical pill, incasing the pill in a rubber envelope and heating the incased pill.

3. The method of making a mobile core for a golf ball or the like which comprises effecting a mixture of a sulfate compound carrying water of crystallization, a metallic hydroxide, and stearic acid, forming the mixture into a solid spherical pill, incasing the pill in a rubber envelope and heat vulcanizing the incased pill.

4. The method of making a core for a ball or the like which comprises forming a solid pill of material capable of reacting chemically to become fluid, the fluid-producing reactants consisting predominantly of a mixture of a metallic sulfate and a metallic hydroxide, at least one of which carries water of crystallization, encompassing the pill with an outer part of the ball, and subsequently rendering the pill material fluid by effecting a chemical reaction of the said metallic sulfate and metallic hydroxide.

5. The method of making a core for a ball or the like which comprises forming a solid pill of material capable of reacting chemically to become fluid, the fluid-producing reactants consisting predominantly of a mixture of barium hydroxide and ammonium alum, at least one of which carries water of crystallization, encompassing the pill with an outer part of the ball, and subsequently rendering the pill material fluid by effecting a chemical reaction of the barium hydroxide with the ammonium alum.

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