Nov. 21, 1944. G. K. RYAN 2,363,086

METHOD OF MAKING BALL CORES

Original Filed July 20, 1940

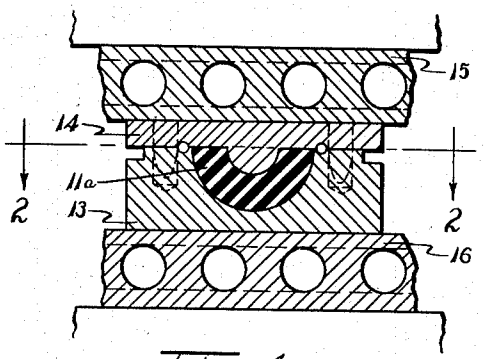


Fig-1

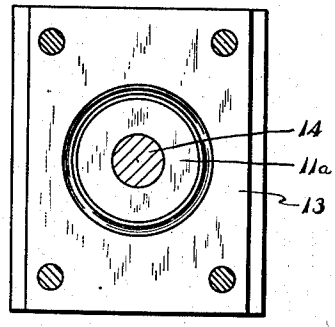


Fig-2

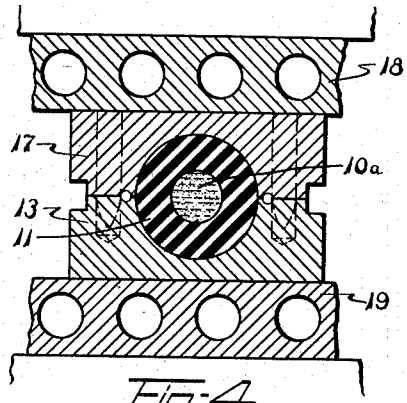


Fig-4

Fig-3



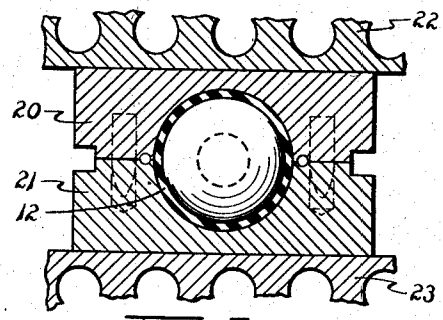


Fig-5

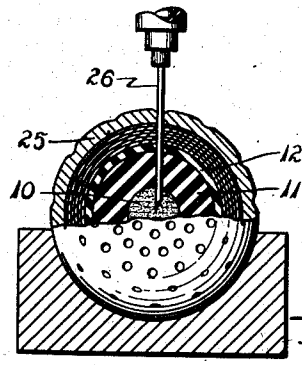


Fig-7

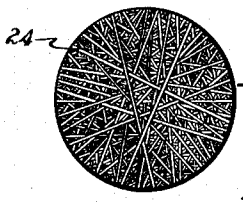


Fig-6

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2,363,086

METHOD OF MAKING BALL CORES

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Original application July 20, 1940, Serial No. 346,601, now Patent No. 2,342,603, dated February 22, 1944. Divided and this application September 4, 1942, Serial No. 457,292

2 Claims. (Cl. 154—18)

This invention relates to ball cores, especially cores for golf balls, although the invention is useful in the manufacture of cores for baseballs and other types of balls where high resilience for long flight following impact is desired. The invention is directed more especially to the construction of the core, upon which rubber thread or tape is subsequently wound under high tension.

This application is a division of my application Serial No. 346,601, filed July 20, 1940, entitled Ball core and method of making the same and which has matured into Patent No. 2,342,603 of February 22, 1944.

It has been proposed heretofore to provide such cores by molding a shell of rubber upon a frozen pellet of a mixture of glue-glycerine or other substance to provide a liquid center, the shell being for the purpose of providing a winding surface for the rubber thread and retaining the liquid.

Such constructions, however, have not been fully satisfactory where it has been desired to increase the internal liquid pressure in the core of the completed ball by needle injection, there having been no adequate provision for preventing leakage through the needle opening after the injection. In attempts to provide a seal for the needle it has been proposed to provide a vulcanized rubber shell having an inner layer of unvulcanized sealing compound, but so far as I am aware no satisfactory way of utilizing this construction has been available, especially with reference to the problem of providing a liquid pellet accurately centered in such shell. It has been exceedingly difficult to obtain true concentricity of a pellet within an unvulcanized mass, and because of this it has been proposed to obtain the liquid center by needle injection of the squeezed shell with the accompanying difficulty of avoiding adhesion of the unvulcanized rubber as a result of such squeezing and with the further difficulty of providing a suitably spherical core on which the winding of the rubber thread could be effectively carried out.

Chief among the objects of this invention are to provide a core construction and procedure for making the same, avoid or obviate the above discussed and other difficulties which have existed in prior procedures, to provide a core that has a satisfactory degree of softness or distortability so that the elasticity of the winding upon it may be fully availed of, together with a firm surface of the core such that the winding under high tension may be effected without cutting into such surface, to provide also for effectively sealing when the completed ball is needled for increasing the internal pressure by injection, and to effect such sealing without requiring any special taping of the core prior to winding the narrower elastic rubber thread. A further object is to provide these improved results by a procedure that is convenient and suitable for rapid and economical manufacture.

These and other objects will be apparent from the following description, reference being had to the following drawing, in which:

Fig. 1 is a vertical section through a half-mold mounted in a vulcanizing press.

Fig. 2 is a section taken along the line 2—2 of Fig. 1.

Fig. 3 is a view of a frozen pellet ready for incorporation in the core.

Fig. 4 is a view like Fig. 1, showing the half-mold thereof associated with another half-mold in a vulcanizing press.

Fig. 5 is a view like Fig. 4 but showing two half-molds of larger cavity size used in a subsequent step of the procedure.

Fig. 6 is a view of a ball after the winding of rubber thread has been applied.

Fig. 7 is a view of the completed ball, parts being broken away to illustrate its construction, and a hollow needle being shown through the wall thereof for injection to subject the ball to high internal pressure.

As hereinbefore stated the invention is concerned primarily with the construction of the core upon which the elastic rubber thread is to be wound. In accordance with this invention I provide for producing a soft core, with its inherent advantages of making possible a ball capable of long flight as a result of the distortion of the core, and elastic winding under impact, and there is made possible a construction that will seal effectively after the injection needle has been withdrawn. At the same time there is provided the somewhat anomalous properties of a firm surface of the core such that winding of the elastic thread thereupon is facilitated, together with a core body that maintains its spherical shape during handling in the manufacturing operations, and a permanent location of the parts thereof, concentrically disposed, without likelihood of settling or otherwise shifting of elements out of position.

To these ends I make the core preferably in three principal parts, including a central liquid center 10, a surrounding shell 11 of soft vulcanized rubber and an enclosing covering 12 of rela-

tively firm vulcanized rubber which, while being relatively stiff as compared to the soft rubber shell 11, is highly resilient. The liquid center 10, which may be of any suitable glue-water or other mixture or liquid, may be provided in the form of a frozen pellet 10*a*. The soft rubber shell 11 may have a considerable amount of mineral oil or other softening agent incorporated in it but preferably is fully vulcanized so as to maintain its shape and support the liquid center concentrically therein. The firm character of the covering 12 serves as a backing when the needle has been withdrawn after injection of the completed ball to resist outward flow of the center materials and to facilitate sealing by the soft rubber of the shell 11, and the covering 12 serves also by its firm property to facilitate winding of the rubber thread immediately upon the same under high tension without undesirable cutting of its surface and without requiring a primary application of rubber tape as distinguished from narrow thread.

In order to obtain true concentricity of the pellet 10*a* within the shell 11, the latter preferably is formed as two half-shells and partially vulcanized in such form before the introduction of the pellet. Such formation of each half-shell 11*a* is illustrated in Fig. 1 wherein a half-mold 13 with a cover 14 defines a suitable cavity therebetween for producing the half-shell 11*a*. During the molding, heat may be supplied from steam jacketed press platens 15, 16 so that the half-shell 11*a* will be semi-vulcanized to hold its shape when removed from the mold.

Two half-shells 11*a*, 11*a*, partially vulcanized are combined with a central frozen pellet 10*a* and placed in a mold shown in Fig. 4, which mold comprises sections 13, 17. The mold may be held closed between heated platens 18, 19 a sufficient time for the halves of shell 11 to become firmly united and for the composition thereof to become nearly vulcanized, while nevertheless retaining its soft character. The shell thus formed is then placed in a mold of larger cavity together with a surrounding body of rubber to mold thereon the covering 12. This may be effected as shown in Fig. 5 in associated mold halves 20, 21, and again heated platens 22, 23 may be used to supply heat to vulcanize the rubber compositions in such mold. The composition of the covering 12 is preferably of a type that cures with comparative rapidity, so that the shell 11 which has already had two stages of cure, will complete its vulcanization with the covering 12, and so that the core as it is taken from the mold of Fig. 5 is a fully vulcanized core which does not require delicate handling and which is immediately ready for the operation of winding the rubber thread thereon.

Such rubber thread, indicated at 24, may be wound upon the core in any suitable manner, after which a cover 25 of gutta percha or the like may be molded directly upon the winding 24. The ball is then ready for the introduction of a hollow needle 26 as shown in Fig. 7 to inject added liquid into the center under high pressure. Upon removal of the needle 26, the rubber of the shell 11, while fully vulcanized and therefore lacking flowability in the sense of unvulcanized rubber, by coaction with the covering 12 of relatively firm rubber and the pressure of the superimposed winding, is nevertheless effective to seal the needle opening and prevent the liquid of the center from following the needle and leaking out from the core.

While the invention has been described with reference to the method of making golf balls, features thereof have been found useful also in the manufacture of other balls, such for example as baseballs where yarn rather than rubber thread is wound upon the core or center, but under tension thereon.

Variations may be made without departing from the scope of the invention as it is defined in the following claims.

I claim:

1. The method of making a golf ball core suitable for high tension winding thereon and needle injection of the completed ball, comprising providing a congealed center pellet, forming and partially vulcanizing half shells of a mixture of rubber and a softening agent, assembling the half shells about said center in a mold and applying heat and pressure to unite said half shells to each other about said center while advancing vulcanization of the half shells, molding a covering of firm rubber composition about said half shells with said center pellet contained therein, and fully vulcanizing said covering while completing the vulcanization of said half shells.

2. The method of making a golf ball core suitable for high tension winding thereon and needle injection of the completed ball, comprising providing a center of frozen liquid, forming and partially vulcanizing half shells of a mixture of rubber and a mineral oil, assembling the half shells about said center in a mold and applying heat and pressure to unite said half shells to each other about said center while advancing vulcanization of the half shells, molding a covering of firm rubber composition about said half shells and said center, and fully vulcanizing said covering while completing the vulcanization of said half shells.

GEORGE K. RYAN.