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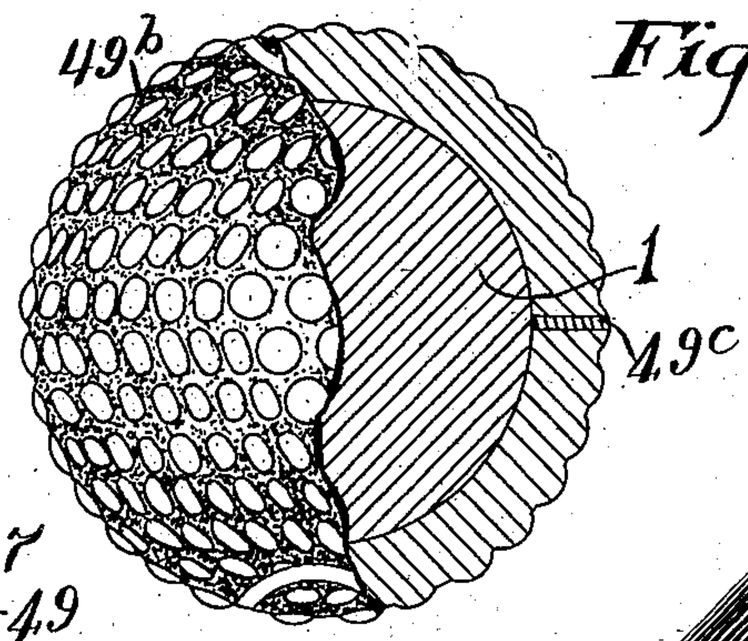
F. H. RICHARDS.

GOLF BALL.

APPLICATION FILED JUNE 10, 1902.

NO MODEL.

Fig. 1.



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FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

GOLF-BALL.

SPECIFICATION forming part of Letters Patent No. 721,463, dated February 24, 1903.

Application filed June 10, 1902. Serial No. 110,967. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Golf-Balls, of which the following is a specification.

This invention relates to playing-balls, especially those used in the game of golf; and its chief object is to center the filling or core accurately in a strong, solid, and inexpensive shell and otherwise to improve the ball, and especially to enable it to give a uniform response upon whatever part of the ball the blow is received, which is a feature of importance in balls intended for golf.

In the accompanying drawings, Figure 1 is a part-sectional view of one of the types of golf-ball made in accordance with my improvements. Fig. 2 is a sectional view of one form of apparatus for making the ball.

In the views similar parts are designated by similar characters of reference.

For the core or filling of the ball I prefer to employ a soft-rubber sphere 1, preferably solid, although my invention contemplates the employment of any other suitable simple or compound core. This I suspend within a mold consisting, preferably, of a lower section 2 and an upper section 3, each section having a hemispherical depression or cup, which depressions together form a spherical chamber or cavity 4. Said chamber may be provided with pits 5 for embossing the ball-shell with brambles. The lower mold-section 2 may have a recess 6, preferably rectangular, forming a seat for the upper section 3, thereby securing a perfect match of the sections. The core may be suspended within the relatively large mold-chamber 4 by means of needles or points, which are preferably arranged in opposite pairs, as indicated at 7 and 7^a, 8, and 8^a, Fig. 3, the needles in each pair being on a single diametrical line and at right angles to the needles in the other pair and all of the needles being level with the center of the ball. The needles are driven into the periphery of the core, as at Fig. 2, thereby to suspend the latter centrally of the mold with the requisite stability and accuracy during the subsequent casting of a shell thereon, the needles being firmly supported in bearing-holes in the lower mold-section 2, as indicated at 7^b. The framework of the apparatus consists in this instance of a bed 9, having legs 10 and also having a depressed seat 11 for the lower mold-section 2, said section being held to said seat by one or more screws 12. The needles are provided with horizontal shanks or slides 13, 13^a, 14, and 14^a, which are mounted in ears 15, provided upon the tops of standards 16, erected upon the bed 9. Each of said needle-slides is rigidly guided in its supports and is capable of horizontal movement toward and from the center of the ball-mold. The needle-operating mechanism also includes four driving-arms 17, each extending down through an opening 18 in the bed and being mounted at its lower end upon a shaft or pivot 19, mounted in lugs 20, depending from the bed. Each of said driving-arms has a pin at connection at 21 to the needle, so that by vibrating said arms the needle-slides and needles may be driven to and fro. Rearwardly-extending arms 22, rigid with the vertical arms 17, are connected by drop-links 23 to a central vertically-sliding driver 24, said links working in radial slots 24^a, formed on said driver and being pivoted thereto at 25. Said driver 24 is mounted to slide upon a vertical stem 26, depending from the bed 9 at the center of the system of operating-levers, and is driven upwardly by means of a lever 27, pivoted between its ends at 28 to a hanger 29, depending from the bed, and carrying at its outer end a handle 30, whereby the needles may be operated in unison. Preferably a spring 31, coiled about the upper end of stem 26 and compressed between the driver 24 and the lower surface of the bed 9, acts constantly upon the driver in a direction to press the needles inwardly or toward the center of the ball-mold, and the lower end of stem 26 is threaded and provided with a nut 32 to limit the movement of the levers effected by said spring.

I preferably clamp the mold-sections 2 and 3 together by means of wing-nuts 33, working on the upper ends of vertical threaded rods 34, which are pivoted at their lower ends in lugs 35, provided upon the lower mold-section 2, said nuts 33 bearing upon ears 36, which are provided upon the upper mold-section 3, and said ears being slotted at their

outer ends at 36ª, so as to permit the clamping-rods to be cast off, thereby to release and permit removal of the upper mold-section.

The shell material may be supplied to the mold-chamber in a mobile or fluent condition by any suitable means, that illustrated herein consisting of a vertical cylindrical vessel 37, set upon a pedestal 38, erected upon the bed 9 and connected by a pipe 39 to the half of the ball-chamber 5 which is contained in the lower mold-section 2, said section having an inlet 40, which connects the lower end of said pipe 39 with said chamber. The shell material, such as gutta-percha or celluloid, may be kept hot and fluent by means of any suitable heating device—such, for instance, as a gas-burner 61, placed beneath said vessel 37, the flame being indicated at 41ª. In the vessel 37 is fitted a piston 42, operated by a rod 43 or otherwise for forcing the fluent material from the vessel through the pipe 39 into the mold at 40, one of the principal functions of the piston being to apply pressure to the fluent material after the mold is filled and maintain such pressure during the subsequent hardening of the shell, thus "feeding" the casting and insuring the solidity thereof, the purpose of the feeding operation being to supply additional material to make up for the shrinkage of the casting due to cooling.

At Fig. 2 is indicated a vacuum-pump, which may be connected to a nozzle 45, inserted in the upper mold-section 3 and opening into the top of the mold-chamber, the opening being provided with a valve 46, whereby communication between the vacuum-pump and the mold-chamber may be opened or closed. Any suitable air-exhausting apparatus may be employed, and I recommend an apparatus which includes a chamber in which a good vacuum is constantly maintained, which chamber may be put into communication with the mold-chamber at will by means of the valve 46.

In operation the clamping-rods 34 are cast off, and the upper mold-section 3 is lifted or removed, and by depression of the handle 30 the sliding driver 24 is forced up, thrusting up all of the links 23 and arms 22 and swinging outwardly the vertical arms 17, thereby withdrawing the needles. Thereupon the rubber or other core 1 is inserted in the mold-chamber, and while it is held centrally of the chamber the handle 30 is released, and the needle mechanism is forced by the spring 31 to normal position, the points of the needles preferably being caused to penetrate the core, as at Fig. 2. The four needles maintain the core immovably in the mold. The upper mold-section 3 is then replaced and by means of the rods 34 and nuts 33 is clamped firmly to the lower mold-section 2, forming a tight joint. Steam or hot water is caused to circulate through one or more suitable channels 47 in the lower mold-section and 48 in the upper mold-section, so as to heat the same, although in some cases my invention may be practiced without previous heating of the mold. The valve 46 is opened, and by means of the pump 44 or other apparatus air is exhausted from the mold-chamber. Then by means of the piston 42 the fluent shell material 49 is forced down through the pipe 39 and inlet 40 into the mold-chamber 4, as at 49ª, Fig. 2. When sufficient material is forced in to completely fill the chamber 4, the valve 46 is closed and escape of the material 49ª is prevented, whereupon by means of the piston 42 great pressure is applied to the material 49 and 49ª, so as to compact the latter and also put the core 1 under great compression. While this compression is maintained cold water or other fluid is circulated through the channels 47 and 48, thereby cooling the shell material 49ª to an extent to harden said shell, as at 49ᵇ, Fig. 1. When the shell as thus cast is sufficiently hardened to enable it to retain the core in a state of compression, the handle 30 is depressed, causing the needles to be withdrawn. The clamping-rods 34 are cast off, the upper mold-section 3 is removed, and the cast shell, with its core, is withdrawn from the lower section. If desired, the holes left by the needles may be plugged, as at 49ᶜ, Fig. 1.

It will be seen that ball-shells may be cast in rapid succession at very low cost, that the operation is simple and the apparatus is inexpensive, that the liability of forming irregular air bubbles or pockets is wholly avoided, that the material of the shell is highly compacted owing particularly to the exclusion of minute air-bubbles, which is due in a large degree to the process of casting the shell in a vacuum, the completed shell consisting of a single homogeneous casting instead of a mixed mass of plastic material and air, that the liability is avoided of either the displacement of the core or the undue thinning of the shell at any point by reason of the existence of a large air-bubble between the core and the shell, that the liability present in welded shells of bursting of the ball at the weld is wholly avoided, that the expense of making separate half-shells and welding them together is avoided, that the liability sometimes present in laminated shells of cracking or peeling off is also avoided, and that the core is held under powerful compression by a shell which is uniformly knit together throughout and is practically unbreakable, and hence an efficient and durable ball is produced at very low cost. The cores are accurately centered within the shells, while an indefinite quantity of balls may be produced all exact duplicates in structure and quality.

Having described my invention, I claim—

1. A golf-ball comprising a spherical core of soft or yielding elastic material, and a compressed shell of gutta-percha cast in one piece thereon and holding said core under compression; said core being substantially concentric with said shell.

2. A golf-ball comprising a spherical core

of soft rubber, and a compressed shell of plastic material cast in one piece thereon and holding said core under compression; said core being substantially concentric with said shell.

3. A golf-ball comprising a spherical core of soft rubber, and a compressed shell of gutta-percha cast in one piece thereon and holding said core under compression; said core being substantially concentric with said shell.

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