

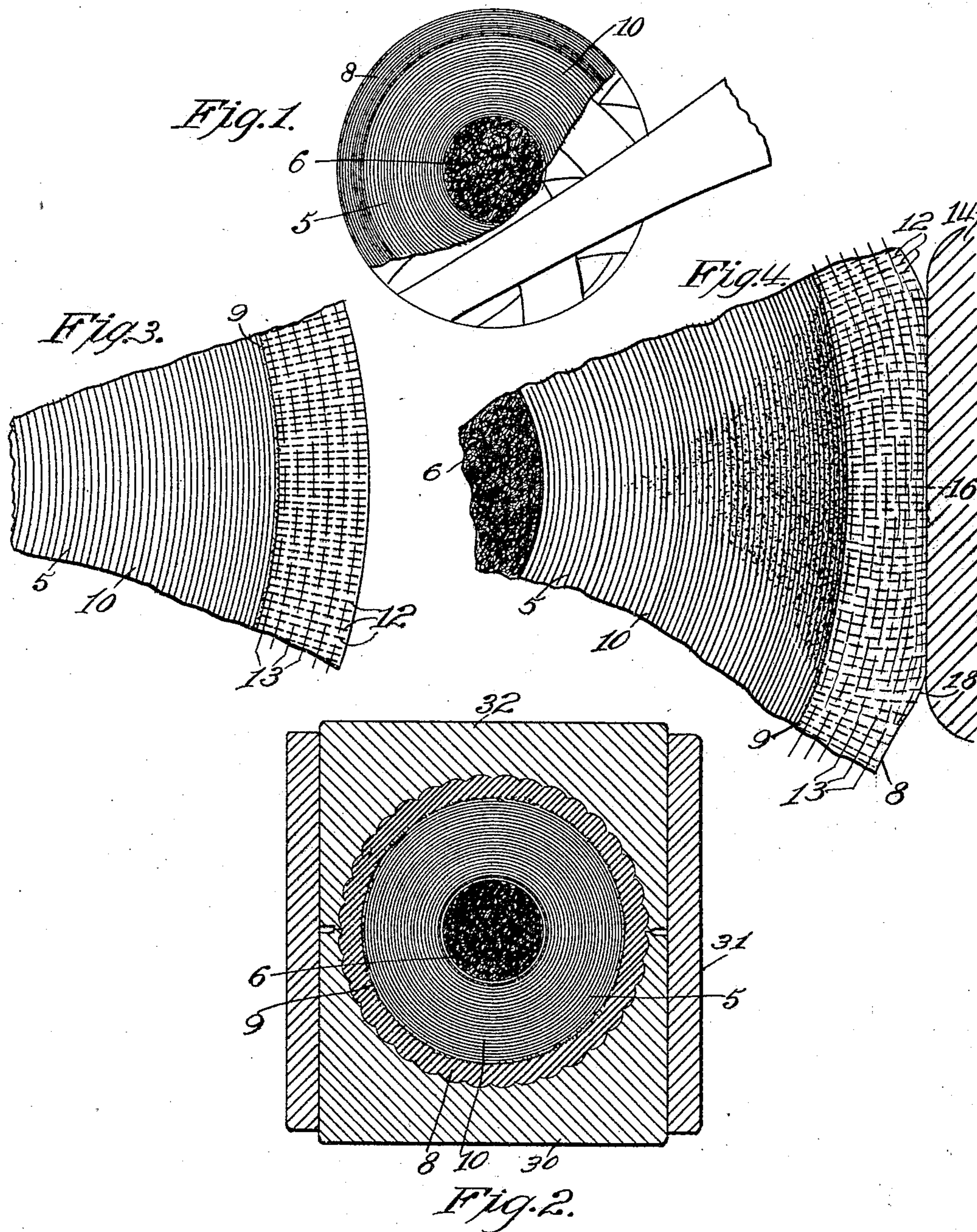
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E. KEMPSHALL.
MANUFACTURE OF GOLF BALLS.

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NO MODEL.



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MANUFACTURE OF GOLF-BALLS.

SPECIFICATION forming part of Letters Patent No. 764,598, dated July 12, 1904.

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To all whom it may concern:

Be it known that I, ELEAZER KEMPSHALL, a citizen of the United States, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in the Manufacture of Golf-Balls, of which the following is a specification.

This invention relates to the manufacture of playing-balls, and more especially to that class of balls used in playing the game of golf.

The object of the present invention is to furnish an improved method or process by which a ball of high efficiency and durability can be manufactured economically and by convenient methods and apparatus and in which the finished balls may be produced of a high degree of uniformity and with accuracy of location of the center of gravity, also with a highly-uniform resilient quality over the entire surface thereof.

In the drawings accompanying and forming a part of this specification, Figure 1 is a view, partially in section, illustrative of my present improvements in playing-balls and in process of construction. Fig. 2 is a sectional view of the ball shown located within a lower mold or die 30, a corresponding upper mold or die 32, and an inclosing ring or retaining member 31, by means of which in the manufacture of the ball the outer member or cushion-cover thereof may be subjected to heat and pressure. Figs. 3 and 4 are partial sectional views of a diagrammatic character for illustrating certain features of the improved ball, for the manufacture of which my present improvements are more especially designed.

Similar characters of reference denote like parts in all the drawings.

In the manufacture of this improved ball I preferably form the core or ball center 5 of tense windings of cured rubber, and for this purpose I prefer to use "acid-cured" or suitably-vulcanized sheet-rubber; but in some cases said core or ball center proper may be otherwise formed. A center piece of hair or other suitable elastic or yielding material may be used. In practice I have found such a hair center piece, as 6, to have when brought under

high tension a high quality and efficiency as a center piece for the ball.

For the outer shell or cover 8 of the ball I employ caoutchouc, preferably in sheet form, (preferably also in the form of quite thin strips or sheets,) and wind the same under some tension over the entire outer surface of the core 5 to form a shell of a substantial but moderate thickness. The proportions about as shown in Fig. 1 of the drawings are deemed suitable for making balls for use in playing the game of golf.

A suitable resilient core 5 having been provided and the material for the outer shell 8 wound thereon, (such material being rubber suitably prepared for vulcanization, but being when wound on the core not yet vulcanized,) this ball so built up, but as yet uncompleted, is then subjected to heat and pressure in suitable molds or dies, as will be understood, for instance, by referring to Fig. 2, and the pressure is continued until the said layer 8 is well vulcanized by the heat and pressure of the molds or dies, during which operation the windings of the shell 8 become thoroughly attached together and vulcanized into one mass which is practically seamless throughout the entire area of the ball and which, besides having all its component portions firmly united together, also becomes united to the outer portion of the core 5 at the line 9. The manner in which the shell 8 is thus united to the outer surface of the core 5 causes, as I apprehend, a distant modification or control of the resiliency and coaction which takes place in the shell 8 and the core 5 immediately below where the ball is struck. When the rubber cover 8 is thus completed by vulcanization in place of the ball-core, the ball then has a high efficiency under heavy blows, as required, for instance, in making a "long drive" in playing the game of golf. The center piece 6 may be omitted; also when used it may be varied in size to properly provide for the slight flexure of the ball 10, as required.

An important advantage of my present improvement is that it permits of the manufac-

ture of the complete golf-ball by the use of rubber alone, with the exception, of course, of the center piece when this is employed and made of other material. In some cases a rubber center 6 may be employed. My present improvements also furnish a means for making a ball of superior efficiency and quality at a low cost for the reason, among others, that no gutta-percha is required.

10 In the diagrammatic view of Fig. 3 the windings of the ball center or ball proper are indicated by the concentric line 10. For the purposes of comparison radial lines 12 are drawn in Figs. 3 and 4, which show by enlarged sectional view a portion of the cushion-cover of the finished ball. That this cover may be so formed as to become an integral seamless blanket or covering made up of rubber originally in the form of strips or sheets is indicated in this figure by the broken lines 13, which may also be considered as representing the original windings of which the cover 8 was built up of vulcanized rubber, although this rubber may be applied in any suitable form and manner. Comparing said lines 12 and 13 in Fig. 3 with the corresponding lines in Fig. 4 it will become evident how the ball and its cushion-cover when made in accordance with my improved process acts under the force of a heavy blow. In Fig. 4 the reference character 14 designates some suitable driver—as, for instance, a golf-stick—and this view represents in a diagrammatic way by a partial sectional view corresponding to Fig. 3 how the golf-ball is subjected to compression and distortion by the force of the blow, especially the adhering and relatively mobile cushion-cover thereof. When the ball is struck by the driver, as indicated, for instance, in Fig. 4, the center portion 16 of the cushion-cover 8 is driven directly inwardly toward the center of the ball, and is thereby being considerably reduced in thickness for the moment under the force of the blow. The extremely high pressure to which the rubber is thus subjected at the point 16 and immediately adjacent thereto is so great as to tend to cause the relatively low-tensioned rubber in said member 8 to flow outwardly from the point 16 as a center, since the ball is spherical. If such cover 8 were loosely fitted—that is, if it were not “integrally” joined throughout the periphery of and to the ball 10—this pressure of the driver would cause that portion of the cover which is brought under pressure between the driver and the ball 10 to become extended circumferentially of the ball, and thus cause the portion of the cover—as, for instance, a circular zone at about the point 18—to slide outwardly on the ball 10, and this would evidently tend to materially decrease the value and efficiency of the blanket or cover 8 as to its kind and extent of coöperation with the material of highly-resilient power preferably forming the ball 10. By my process the ball-cover 8

may be integrally joined at the line 9, so that any such sliding action as I have mentioned is forcibly prevented by reason of the structural connection produced by this improved method of manufacture. As compared with the very high initial tension of the windings in the ball 10 when this is made of suitably-cured windings of strips or sheet-rubber of high quality the tension or initial resistance of the rubber in the cushion-cover 8 is relatively very low. A result of this is that the first contact of the driver on the cushion-cover meets with slight opposition until the rubber has been compressed sufficiently to extend the area of contact between the cover and the driver to a considerable distance. For illustrating this I have in an approximate way drawn the enlarged fractional view, Fig. 4, with its diagrammatic and illustrative lines. The lines 13 illustrate in Fig. 3 the concentric relation of the cover 8 in the ball 10. The radial lines designated by 12 are intended to represent in a diagrammatic way the normal unstrained and relatively untensioned relation of the material in the member 8. The distortion of these lines between the ball 10 and the driver 14, as illustrated in Fig. 4, is intended for showing in a diagrammatic way and approximately the action which takes place during the continuance of the pressure of the driver against the ball when this is struck with a heavy blow.

In Fig. 2 of the drawings I have shown for the purpose of more fully setting forth my present improvements a ball-finishing mold comprising a carrier or retaining member 31, within which is fitted to slide a pair of molds or dies 30 and 32, this apparatus being adapted for use in suitable hydraulic presses and in connection with apparatus for heating the molds to the proper degree for obtaining the desired amount of vulcanization in the outer shell or cover 8.

The improved playing-ball herein described constitutes the subject-matter of a separate application concurrently pending herewith.

Having thus described my invention, I claim—

1. A process of forming playing-balls consisting in employing a suitable core, winding thereon a quantity of cured rubber under high tension, applying thereupon a quantity of caoutchouc, and then vulcanizing the caoutchouc to the rubber.

2. A process of forming playing-balls consisting in employing a suitable highly-resilient core, winding thereon in miscellaneous directions a quantity of cured rubber strip under high tension, winding on said cured rubber a quantity of caoutchouc sheeting to form a shell, and then vulcanizing the caoutchouc to said rubber so that the caoutchouc will adhere to said rubber.

3. A process of forming playing-balls consisting in employing a suitable resilient core

of compressible material, compressing said core by winding thereon a quantity of cured rubber strip under high tension to form a layer, winding on said layer a quantity of sheet-caoutchouc, and then vulcanizing said caoutchouc windings.

4. A process in forming playing-balls consisting in employing a core of compressible material, in compressing said core by placing thereon a multitude of windings of acid-cured rubber, placing on said acid-cured rubber a multitude of windings of sheet-caoutchouc, and then vulcanizing said caoutchouc windings to form a shell.

5. A process in forming playing-balls consisting in employing a suitable core, winding thereon a quantity of cured rubber under high tension, applying thereupon a quantity of caoutchouc in sheet form under some tension, placing the ball thus formed in suitable dies, and then vulcanizing the caoutchouc windings by the heat of the die while the pressure is maintained.

6. A process in forming playing-balls consisting in employing a resilient compressible core, winding thereon under high tension a quantity of acid-cured rubber in miscellaneous directions, winding on said acid-cured rubber caoutchouc sheeting in miscellaneous directions and under some tension, placing the ball thus formed in a mold, vulcanizing said caoutchouc under heat and pressure, and maintaining the pressure until the ball cools and hardens.

7. A process in forming playing-balls consisting in employing a core of fibrous material, winding thereon a quantity of acid-cured rubber under high tension to compress said core, applying on said rubber a quantity of caoutchouc in sheet form, placing the ball in a mold, vulcanizing the caoutchouc by the heat of the mold while pressure is maintained, and maintaining the pressure while the shell cools and hardens.

8. A process in forming playing-balls consisting in employing a core of hair, winding thereon a quantity of acid-cured rubber under high tension to compress said core, applying on said rubber a quantity of caoutchouc in sheet form, placing the ball in a mold, vulcanizing the caoutchouc by the heat of the mold while pressure is maintained, and maintaining the pressure while the shell cools and hardens.

9. A process in forming playing-balls consisting in employing a core of fibrous material, winding thereon a quantity of acid-cured rubber under high tension to compress said core, applying on said rubber a quantity of caoutchouc in sheet form, placing the ball in a mold and vulcanizing the caoutchouc by the heat of the mold while pressure is maintained.

10. A process in forming playing-balls consisting in employing a core of hair, winding

thereon a quantity of acid-cured rubber under high tension to compress said core, applying on said rubber a quantity of caoutchouc in sheet form, placing the ball in a mold, and vulcanizing the caoutchouc by the heat of the mold while pressure is maintained.

11. A process in forming playing-balls consisting in employing a core of hair, winding thereon a quantity of acid rubber under high tension to compress said core, applying on said rubber a quantity of vulcanizable material in sheet form, placing the ball in a mold, vulcanizing the vulcanizable material by the heat of the mold while the pressure is maintained, and maintaining the pressure while the shell cools and hardens.

12. A process in forming playing-balls consisting in employing a core of fibrous material, winding thereon a quantity of acid-cured rubber under high tension to compress said core, applying on said rubber a quantity of vulcanizable material in sheet form, placing the ball in a mold, and vulcanizing the vulcanizable material by the heat of the mold while pressure is maintained.

13. A process in forming playing-balls consisting in employing a core of hair, winding thereon a quantity of acid-cured rubber under high tension to compress said core, applying on said rubber a quantity of vulcanizable material in sheet form, placing the ball in a mold, and vulcanizing the vulcanizable material by the heat of the mold while pressure is maintained.

14. As an improvement in the manufacture of playing-balls, the process comprising the winding of a ball-core, of a quantity of windings of cured rubber under high tension, applying thereon a quantity of caoutchouc, and then vulcanizing the caoutchouc to the rubber.

15. As an improvement in the manufacture of golf-balls, a process comprising the winding of the ball-core, of windings of cured rubber under high tension, building the outer covering on said core by forming the covering on the core, of windings of vulcanizable but unvulcanized rubber in strip form and subjecting the ball so built up to heat and compression to the extent of vulcanizing the outer shell in place on the core, thereby to consolidate and vulcanize the material in the shell and join the shell to the ball-core, substantially as set forth.

16. The process of making playing-balls consisting in building up a ball-core by winding in miscellaneous directions a quantity of cured-rubber strip under high tension to form a sphere, winding on said cured rubber a quantity of caoutchouc sheeting to form a shell, and then vulcanizing the caoutchouc to said rubber so that the caoutchouc will adhere to said rubber.

17. A process in making playing-balls consisting in winding a quantity of cured-rubber

strip under high tension to form a ball-core, winding on said ball-core a layer of sheet-caoutchouc, and then vulcanizing said caoutchouc windings.

5 18. A process in making playing-balls consisting in building up a ball-core by winding a strip of cured rubber into a sphere, placing on said cured rubber a multitude of windings of sheet-caoutchouc, and then vulcanizing said
10 caoutchouc windings to form a shell.

19. A process in making playing-balls consisting in building up a ball center by winding a strip of cured rubber layer over layer in miscellaneous directions to form a sphere,
15 applying to said rubber a quantity of vulcanizable material in sheet form, vulcanizing

the vulcanizable material so that said material will adhere to the rubber.

20. A process in making playing-balls consisting in winding a strip of cured rubber in
20 miscellaneous directions under tension to form a sphere, winding upon said sphere a quantity of vulcanizable material in sheet form, and then vulcanizing the vulcanizable material to make a homogeneous shell. 25

Signed at Nos. 9 to 15 Murray street, New York, N. Y., this 1st day of December, 1903.

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Witnesses:

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