COMMONWEALTH of AUSTRALIA
Patents Act 1952

APPLICATION FOR A STANDARD PATENT

I/We

Acushnet Company

of

Belleville Avenue, New Bedford, Massachusetts, 02742, United States of America

hereby apply for the grant of a Standard Patent for an invention entitled:

 Process of making a golf ball cover

which is described in the accompanying complete specification.

Details of basic application(s):-

<table>
<thead>
<tr>
<th>Number</th>
<th>Convention Country</th>
<th>Date</th>
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<tbody>
<tr>
<td>280565</td>
<td>United States of America</td>
<td>6 December 1988</td>
</tr>
</tbody>
</table>

The address for service is care of DAVIES & COLLISON, Patent Attorneys, of 1 Little Collins Street, Melbourne, in the State of Victoria, Commonwealth of Australia.

DATED this SIXTEENTH day of NOVEMBER 1989

To: THE COMMISSIONER OF PATENTS

[Signature]

a member of the firm of DAVIES & COLLISON for and on behalf of the applicant(s)

Davies & Collison, Melbourne
COMMONWEALTH OF AUSTRALIA
PATENTS ACT 1952
DECLARATION IN SUPPORT OF CONVENTION OR NON-CONVENTION APPLICATION FOR A PATENT

In support of the Application made for a patent for an invention entitled "PROCESS OF MEETING A GOLF BALL COVER"
Walter R. Uihlein, Vice President of Acushnet Company, having a principal place of business at Belleville Avenue, New Bedford, Massachusetts 02742, U.S.A.
do solemnly and sincerely declare as follows:—

1. (a) I am authorized by ACUSHNET COMPANY the applicant, for the patent to make this declaration on its behalf.
or (b) I am authorized by ACUSHNET COMPANY

the applicant, for the patent to make this declaration on its behalf.

2. (a) John P. Giza, a United States citizen, residing at 10 Morningside Avenue, Acushnet, Massachusetts 02743, U.S.A.

or (b) John P. Giza, a United States citizen, residing at 10 Morningside Avenue, Acushnet, Massachusetts 02743, U.S.A.

by virtue of an assignment dated December 2, 1988 whereby the applicant is the assignee of the actual inventor in respect of the invention.

3. The basic application, as defined by Section 141 of the Act made in the United States on the 6 December 1988 by John P. Giza

in the United States on the 6 December 1988 by John P. Giza

in the United States on the

in the United States on the

by virtue of an assignment dated December 2, 1988 whereby the applicant is the assignee of the actual inventor in respect of the invention.

4. The basic application referred to in paragraph 3 of this Declaration was the first application made in a Convention country in respect of the invention the subject of the application
Declared at New Bedford, this 1st day of September 1989 ACUSHNET COMPANY

CROSS OUT WHICHEVER OF PARAGRAPHS 1(a) OR 1(b) DOES NOT APPLY.

CROSS OUT WHICHEVER OF PARAGRAPHS 2(a) OR 2(b) DOES NOT APPLY.

CROSS OUT PARAGRAPHS 3 AND 4 FOR NON-CONVENTION APPLICATIONS. FOR CONVENTION APPLICATIONS INSERT BASIC COUNTRY(S) FOLLOWED BY DATE(S) AND BASIC APPLICANT(S).

INSERT TITLE OF INVENTION.

INSERT FULL NAME(S) AND ADDRESS(ES) OF DECLARANT(S) BEING THE APPLICANT(S) OR PERSON(S) AUTHORIZED TO SIGN ON BEHALF OF AN APPLICANT COMPANY.

CROSS OUT WHICHEVER OF PARAGRAPHS 1(a) OR 1(b) DOES NOT APPLY.

1(a) relates to application made by individual(s).
1(b) relates to application made by company; insert name of applicant company.

CROSS OUT WHICHEVER OF PARAGRAPHS 2(a) OR 2(b) DOES NOT APPLY.

2(a) relates to application made by individual(s).
2(b) relates to application made by company(s) or persons(s) who are not inventor(s); insert full name(s), and address(es) of inventor(s).

CROSS OUT PARAGRAPHS 3 AND 4 FOR NON-CONVENTION APPLICATIONS. FOR CONVENTION APPLICATIONS INSERT BASIC COUNTRY(S) FOLLOWED BY DATE(S) AND BASIC APPLICANT(S).

SIGNATURE OF DECLARANT(S) (NO ATTESTATION REQUIRED).

NOTE: INITIAL ALL ALTERATIONS.

Signature of Declarant(s) (no attestation required).

Note: Initial all alterations.

By Walter R. Uihlein

Vice President
1. In a method for forming a golf ball cover from melted ionomeric resin cover stock by either injection molding a cover about a core or forming semi-circular cover halves which are then compression molded about a core, the improvement comprising:

flashing said melted ionomeric resin cover stock at a temperature above about 400°F (204°C) to release moisture from said melted ionomeric resin cover stock thereby reducing the moisture of said melted ionomeric resin cover stock to below about 900 ppm.
COMMONWEALTH OF AUSTRALIA
PATENTS ACT 1952
COMPLETE SPECIFICATION

NAME & ADDRESS OF APPLICANT:

Acushnet Company
Belleville Avenue
New Bedford Massachusetts 02742
United States of America

NAME(S) OF INVENTOR(S):

John P. GIZA

ADDRESS FOR SERVICE:

DAVIES COLLISON
Patent Attorneys
1 Little Collins Street, Melbourne, 3000.

COMPLETE SPECIFICATION FOR THE INVENTION ENTITLED:

Process of making a golf ball cover

The following statement is a full description of this invention, including the best method of performing it known to me/us:-
This invention relates to golf balls and more specifically to an improved process for making SURLYN® covered golf balls.

Two-piece and wound golf balls are made by molding a cover about a core. The core of a wound golf ball is either a liquid filled or solid center around which elastic thread has been wound. The core of a two-piece golf ball is a solid ball of material around which a cover is molded. Cores, of both the wound and two-piece golf ball, typically measure 1.4 to 1.6 inches (3.6 to 4.1 cm.) in diameter. The cover is molded about the core to produce a golf ball with the minimum United States Golf Association (USGA) diameter of 1.68 inches (4.27 cm.). So-called "British" golf balls are made in the same manner except the core size is typically between 1.35 to 1.55 inches (3.43 to 3.94 cm.) and have an overall minimum diameter of 1.62 inches (4.11 cm.).

Balata and SURLYN® are generally used as cover material. SURLYN® was discovered in the middle 1960's by DuPont and has been adopted by the golf
ball industry for use as a cover composition because of its good cut resistance and ready availability. SURLYN® is a trademark for a group of ionomeric resins. U.S. Patent No. 3,264,272 dated August 2, 1968 teaches a wide variety of ionomeric resins and U.S. Patent No. 3,454,280 dated July 8, 1969 teaches the use of SURLYN® as a cover material for golf balls. U.S. Patent No. 3,819,768 dated June 25, 1974 alleges that a blend of sodium and zinc SURLYN® produces a more durable cover on a golf ball than a single SURLYN®. These ionomeric resins are copolymers of an olefin and an alpha, beta ethylenically unsaturated carboxylic acid with 10-90% of the carboxylic groups being neutralized by metal ions. Commercially, these ionomeric resins are available only as copolymers of ethylene and methacrylic or acrylic acid, wherein the acid groups are neutralized by sodium, zinc or lithium ions. The commercially available ionomeric resins differ primarily in the quantities of each of the ingredients (ethylene, unsaturated acid and metal ions) present.

Golf ball covers are molded about a core in one of two ways, either by compression molding.
two hollow, semi-circular cover halves about a core or by injection molding cover stock around core. The molding of two semi-circular cover halves around a core is conventional and is generally accomplished by means of a frame containing a plurality of paired ball cup molds. Each ball cup mold bears a dimple pattern which is implanted on the cover halves when the frame is closed and the cover halves are subjected to heat and pressure. The heat and pressure cause the cover halves to join and form a solid, dimpled cover.

The semi-circular cover halves are formed in a conventional molding operation using a mandrel and a cup shaped mold half. The SURLYN® is injected into a closed cavity formed between the mandrel and the cup shaped mold half. Once the half-shell hardens, the closed cavity is opened and the semi-circular cover half removed.

Injection molding of golf ball covers is accomplished in a conventional manner by placing cores inside retractable pin ball cup molds and injecting cover stock around the core. Generally the ball cup molds are housed in a frame.
Prior to molding the cover of a golf ball by injection molding or forming the semi-circular cover halves, the pellets of SURLYN® along with other materials which make up the SURLYN® cover stock material are placed in a hopper which feeds a heated barrel having a screw therein. The screw forces the SURLYN® cover stock through the barrel while the heat softens the SURLYN® into a fluid state.

A problem faced by golf ball manufacturers is water contamination in the SURLYN® cover stock. SURLYN® is very hygroscopic. In order to prevent the SURLYN® from picking up water, SURLYN® is sold in special containers. Golf ball manufacturers are required to buy a special "dry" SURLYN® from the producer of SURLYN® in order to get an acceptable starting material.

These special containers do not always prevent the SURLYN® from hydrating. When the moisture level of the SURLYN® increases beyond 2,000 ppm, the melt flow becomes unstable and the dyes added to cover stock for purposes of coloring the golf ball yield poor results. The instability with the color is especially true with orange colored golf balls.
Applicant has now discovered that by flashing the melted SURLYN® cover stock prior to forming the semi-circular cover halves or injection molding the cover stock about a core that the moisture level of the SURLYN® is lowered to an acceptable level and the melt flow and color are stabilized. This flash step is accomplished on the SURLYN® cover stock material which is typically over 90% by weight SURLYN® and preferably at least about 95% by weight. Additional materials which may be included in the cover stock material include titanium dioxide, dyes, UV absorbers and other known additives.

Figure 1 illustrates an apparatus for accomplishing the present invention; and

Figure 2 illustrates another apparatus for accomplishing the present invention.

Figure 1 illustrates extruder A attached to golf ball injection molding machine or half cup molding machine B. Extruder A comprises barrel 10 which is fed pellets of SURLYN® cover stock material by hopper 12. Gravity causes the pellets to fall into barrel 10. Motor 14 drives screw 16 causing pellets to move from feed end 18 of barrel 10 to melt end 20. Melt end 20 of barrel 10 is connected to either a golf ball injection molding
machine or a half cup molding machine B as shown. Barrel 10 is equipped with heaters 22 that cause the pellets to melt and form a fluid. Vent 24 is positioned towards melt end 20 of barrel 10 as shown in Figure 1. Vent 24 provides a channel from inside barrel 10 to outside barrel 10 and allows for moisture in the SURLYN® cover stock material to escape.

When the melted SURLYN® cover stock material comes into contact with the low pressure zone created by vent 24, the drop in pressure causes the water contained in the melted SURLYN® cover stock material to flash off.

Preferably vent 24 is positioned on barrel 10 at a point where the SURLYN® melt has a temperature above about 400°F (204°C) and more preferably at a point on the barrel where the SURLYN® cover stock material has a temperature between about 400°F (204°C) to about 500°F (260°C).

Chamber 26 is preferably positioned under vent 24 which is only partially filled with SURLYN® melt. As shown in Figure 1, chamber 26 is created by decreasing the diameter of the axis of screw 16. Alternatively, chamber 26 is created by increasing the inner diameter of barrel 10 as shown in Figure 2.
The pressure in chamber 26 is preferably about atmospheric; however, below atmospheric pressure can be used. This allows chamber 26 to act as a flash chamber which allows moisture to be driven off of the SURLYN® melt.

It has been found that by using the vented barrel of Figure 1 wherein the vent is to the atmosphere and is positioned on barrel 10 at a point where the melt has a temperature between about 400°F (204°C) to about 500°F (260°C) that the SURLYN® in hopper 12 having a moisture content of 9,000 ppm has a moisture below about 800 ppm after it has passed through chamber 26. Preferably, the moisture of SURLYN® cover stock material is dropped below about 900 ppm and more preferably below about 800 ppm.

The barrel used to heat the SURLYN® cover stock material has a length to diameter ratio of between about 30:1 to 18:1 and good results have been found using a length to diameter ratio of 20:1.

Figure 1 and 2 show only one vent 24 in barrel 10. Clearly, a plurality of vents can be used so long as they are positioned in accordance with the teachings of this disclosure.
It will be understood that the claims are intended to cover all changes and modifications of the preferred embodiments of the invention, herein chosen for the purpose of illustration, which do not constitute departures from the spirit and scope of the invention.
CLAIMS
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. In a method for forming a golf ball cover from melted ionomeric resin cover stock by either injection molding a cover about a core or forming semi-circular cover halves which are then compression molded about a core, the improvement comprising:

   flashing said melted ionomeric resin cover stock at a temperature above about 400°F (204°C) to release moisture from said melted ionomeric resin cover stock thereby reducing the moisture of said melted ionomeric resin cover stock to below about 900 ppm.

2. The method of claim 1 wherein said ionomeric resin cover stock is flashed at a temperature between about 400°F (204°C) to about 500°F (260°C).

3. The method of claim 1 wherein the cover stock is flashed at atmospheric pressure.
4. A method of making a golf ball cover substantially as hereinbefore described with reference to the drawings.

5. The steps, features, compositions and compounds disclosed herein or referred to or indicated in the specification and/or claims of this application, individually or collectively, and any and all combinations of any two or more of said steps or features.

DATED this SIXTEENTH day of NOVEMBER 1989

Acushnet Company

by DAVIES & COLLISON
Patent Attorneys for the applicant(s)
FIG. 1.

FIG. 2.
END