PATENT SPECIFICATION

Inventor: GEORGE THORNBER

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COMPLETE SPECIFICATION

Improvements in or relating to Inflatable Balls

We, BENJAMIN CROOK & SONS, LIMITED, of 56, Fitzwilliam Street, Huddersfield, in the County of York, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement—

This invention relates to inflatable balls of the kind which are usually made of leather, such as foot-balls, net-balls and the like.

There has been, in recent times, an increasing use of inflatable balls, particularly foot-balls, possessing a white exterior surface. Casings for such balls are usually made in one of two ways. Either they are made of leather coated with a plastic material, or they are made of material comprising a plurality of layers of woven fabric cemented together and coated externally with a plastic material or substance. Casings made according to the first-named method are open to the objection that in order to obtain proper adherence of the plastic covering to the leather it is necessary for the leather to be free from grease the result being that as soon as the plastic covering becomes cracked, as it very quickly does, water penetrates to the leather by which, owing to the fact that the natural water-repellent grease is not present, it is rapidly absorbed. The ball thus not only quickly loses shape, owing to stretching of the leather, but its weight and "response" or behaviour are adversely affected. Casings made according to the second method, that is to say composed of material comprising a plurality of layers of fabric cemented together and coated externally with plastic, are open to the objection that it has hitherto proved impossible to prevent the material stretching. Moreover the "response" or behaviour of a ball the casing of which is composed of the material referred to is very unsatisfactory as compared with that of one having a leather casing.

With a view to overcoming the objections above mentioned, arising from the use of balls having casings of the usual constructions we have described, we have made exhaustive experiments and tests, as a result of which we have been able to produce a casing which has stood up well under all tests, both from the "response" point of view, and from perhaps the more important point of exhibiting good wearing characteristics and of enabling a ball to retain its correct shape, weight and size.

According to this invention a casing for an inflatable ball is characterised by the fact that it comprises a plurality of sections of leather each having bonded to its outer surface one or more layers of fabric having on its or their outer surface a layer of a suitable flexibly plastic.

The plastic covering may be applied to the surface of the fabric material but the fabric material may be thoroughly impregnated with the plastic. When only one layer of fabric is employed it is desirable to have a somewhat thicker layer of surface plastic than when using several layers of fabric.

The plastic should, besides being flexible, be tough, substantially non-absorbent of water and capable of being securely bonded to leather. Examples of plastics suitable for carrying out the invention are those having a polyvinyl chloride base.

The leather employed in carrying out the invention is preferably pre-stretched, as is usual, and also substantially free from grease. Thus, if grease has been employed and not removed during the preparation of the leather, the leather should be de-greased before having the covering applied thereto.

The leather may be of the normal thickness usually employed in the manufacture of similar balls but, in some, and probably the majority of, cases (for example, in order to conform to regulation standards, such as those governing weight) it may be necessary to use thinner leather than that usually employed for similar balls. In some instances leather of somewhat inferior quality but of normal thickness may be used.

The covering may be provided with a roughened or embossed or patterned outer

[*Price 3s. 0d.*]

surface which is preferably obtained in known manner during the operation of uniting the plastic and the fabric material. For footballs a fine grain surface is preferred, while for basket-balls and net-balls a dimpled surface is advantageous.

The covering is preferably pre-formed and then secured to the leather by means of an adhesive. Any suitable adhesive may be used and these may be of the thermosetting type or of the cold-setting type. The latter type is preferred and of this type adhesives having a latex base are particularly suitable.

In one method of carrying out the invention, given by way of example, in the production of football casings one or more sheets of fabric have bonded to its or their outer surface by known methods a layer of white plastic having a basis of polyvinyl chloride. The outer surface of the plastic is given by known methods a fine grain finish. These pre-formed sheets are then bonded to leather, which is appropriately thinner than usual, by the use of pressure and a cold-setting adhesive having a latex base.

The composite sheets thus formed are cut up in the usual way into panels of appropriate size and shape and then sewn together at their edges in the normal way to form a casing of the desired size and shape. If desired, the joints between adjacent component panels of the casing may be treated externally with a suitable plastic or other material or substance to prevent ingress of water but this is not usually necessary.

By appropriate proportioning of the relative thickness of the inner layer of leather and of the composite fabric and plastic or equivalent outer layer, the weight of the casing can be made to correspond to that of a leather casing so that the resultant ball will conform to the regulation standard laid down and its behaviour as regards " response " will be comparable with a casing made wholly of leather.

What we claim is—

1. A casing for an inflatable ball characterised by the fact that it comprises a plurality of sections of leather each having bonded to its outer surface one or more layers of fabric having on its or their outer surface a layer of a suitable flexible plastic, the sections being secured together to form the casing.

2. A casing for an inflatable ball as claimed in Claim 1, in which the layer or layers of fabric is or are thoroughly impregnated with plastic.

3. A casing for an inflatable ball as claimed in claim 1 or claim 2, in which the leather is pre-stretched and free from grease before having the covering layer applied.

4. A casing for an inflatable ball as claimed in any one of the preceding Claims, in which the leather employed is thinner than that usually employed in the manufacture of similar balls wholly of leather.

5. A casing for an inflatable ball as claimed in any one of the preceding Claims, in which the outer surface of the covering is provided with a roughened, or embossed, or patterned, outer surface.

6. A casing for an inflatable ball as claimed in any one of the preceding Claims, in which the covering is pre-formed and then secured to the leather by means of an adhesive.

7. The method of making casings for inflatable balls substantially as herein described.

8. Casings for inflatable balls manufactured substantially as described in the example herein.

BARON & LEWIN,
Chartered Patent Agents,
Station Street Buildings, Huddersfield,
Agents for the Applicants.

PROVISIONAL SPECIFICATION
No. 28571 A.D. 1951

An improvement in or relating to Footballs

We, BENJAMIN CROOK & SONS LIMITED, of 56, Fitzwilliam Street, Huddersfield, in the County of York, a British Company, do hereby declare this invention to be described in the following statement—

Our invention in or relating to footballs has for its object to provide an improved construction of football casing which will overcome certain objections to such casings as hitherto and at present usually constructed.

By far the greater proportion of football casings are made from leather, though other materials have from time to time been proposed, tried, and eventually abandoned for various reasons.

There has been, in recent times, an increasing use of footballs possessing a white exterior surface. Casings for such balls are usually made in one of two ways. Either they are made of leather coated with a plastic material, or they are made of material comprising a plurality of layers of woven fabric cemented together and coated externally with a plastic material or substance. Casings made according to the first-named method are open to the objection that in order to obtain proper adherence of the plastic covering to the leather it is necessary for the leather to be free from grease, the result being that as soon as the plastic covering becomes cracked, as it very

quickly does, water penetrates to the leather by which, owing to the fact that the natural water-repellent grease is not present, it is rapidly absorbed. The ball thus not only quickly loses shape, owing to stretching of the leather, but its weight and "response" or behaviour are adversely affected. Casings made according to the second method, that is to say composed of material comprising a plurality of layers of fabric cemented together and coated externally with plastic, are open to the objection that it has hitherto proved impossible to prevent the material stretching. Moreover the "response" or behaviour of a ball the casing of which is composed of the material referred to is very unsatisfactory as compared with that of one having a leather casing.

With a view to overcoming the objections above mentioned, arising from the use of balls having casings of the usual constructions we have described, we have made exhaustive experiments and tests as a result of which we have been able to produce a casing which has stood up well under all tests, both from the "response" point of view, and from perhaps the more important point of exhibiting good wearing characteristics and of enabling a ball to retain its correct shape, weight and size.

A casing according to the invention is characterised in that it is composed of leather, of suitable quality and appropriately thinner than the leather usually employed to form a casing, having bonded to one of its faces a composite material comprising a plurality of layers of woven fabric suitably cemented together and having its exposed surface composed of a suitable plastic, or equivalent flexible substance or material. The plastic or equivalent covering may be applied to the surface of the composite fabric material but will preferably be formed wholly or mainly by impregnating the component fabric layers before they are cemented together.

Material of the construction described is cut up in the usual way into panels of appropriate size and shape, to form, when sewn or otherwise secured together by their edges, a casing of the desired size, and shape. If desired, the joints between adjacent component panels of the casing may be treated externally with a suitable plastic or other material or substance to prevent ingress of water.

By appropriate proportioning of the relative thicknesses of the inner layer of leather and of the composite fabric and plastic or equivalent outer layer, the weight of the casing can be made to correspond to that of a leather casing so that the resultant ball will conform to the regulation standard laid down, and will behave in exactly the same way as if the casing were made wholly of leather.

BARRON & LEWIN,
Station Street Buildings, Huddersfield,
Agents for the Applicants.

PROVISIONAL SPECIFICATION
No. 631 A.D. 1952

Improvements in or relating to Inflatable Balls

We, BENJAMIN CROOK & SONS LIMITED, of 56, Fitzwilliam Street, Huddersfield, in the County of York, a British Company, do hereby declare this invention to be described in the following statement—

This invention relates to inflatable balls of the kind which are usually made of leather, such as footballs, net-balls and the like.

In our previous Application No. 28571/51 we have referred to the drawbacks associated with footballs made, on the one hand, of leather in the ordinary way and coated, i.e., painted, with a suitable white liquid composition or paint, and footballs made, on the other hand, without the use of leather by stitching together panels cut from laminated materials consisting of layers of fabric previously impregnated with a suitable white plastic composition. Similar drawbacks may obviously apply to other inflatable balls besides footballs. For the same reasons the invention described in our previous application may also be applied to other inflatable balls of the kind usually made of leather.

The invention described in our previous application may also be modified by using only one layer of fabric instead of a plurality of layers, and, further, while it is advantageous to use thinner leather as described in our application, and while it may be necessary in many cases to do so (for example, in order to conform to regulation standards, such as those governing weight) there may be instances where the normal thickness of leather, although possibly of inferior quality, may be employed in carrying out the inventions described in our previous application and in this application.

In developing our previous invention it has been found that satisfactory inflatable balls may be made from a leather casing having bonded thereto a sheet of flexible plastic material which has not been reinforced with fabric.

Thus, according to the present invention, a casing for an inflatable ball of the kind referred to comprises a leather foundation of suitable quality, and where necessary appropriately thinner than the leather usually employed to form a casing, having bonded to its outer face a sheet of suitable non-fabric-

reinforced flexible plastic material.

The plastic material should, beside being flexible, be tough, non-absorbent of water and capable of being securely bonded to leather. Examples of plastics suitable for carrying out this and our previous invention are those having a polyvinyl chloride base.

The leather employed in carrying out this and our previous invention is preferably pre-stretched, as is usual, and degreased, and is preferably chrome-tanned leather in contra-distinction to the vegetable-tanned leather usually used in the manufacture of inflatable balls. Chrome-tanned leather has been found to give better adhesion than vegetable-tanned leather.

Sheets of non-reinforced plastics as generally available are smooth. We may, therefore, employ a sheet that has been deliberately provided with a roughened or embossed or engraved patterned surface during or after manufacture or during or after the bonding of the sheet to the leather as herein described. The production of roughened or patterned surfaces during the manufacture of plastic sheets is well known. As regards roughening or patterning after manufacture of the sheet, while this can be carried out before the sheet is secured to the leather (for example by subjecting thermoplastic sheet to heat and to pressure from an engraved roll or platen) it can conveniently and is preferably carried out by similar methods during the bonding of the plastic sheet to the leather. It is preferred to form a pattern, for example, one of dimples, rather than indiscriminate roughening.

The patterning or roughening above described may be applied to the invention described in our previous application, particularly when, according to that invention, a layer or sheet of plastic material is superimposed on, without substantial impregantion of, a layer or layers of fabric bonded to the outer surface of the leather and to the inner surface of the plastic layer. The patterning or roughening may not be found to be necessary in many cases when an impregnated fabric layer is employed.

The non-fabric-reinforced sheet may be secured to the leather by any convenient method. Usually a suitable adhesive is employed and the assembly compressed with, if necessary, the application of heat.

The manufacture of casings from the materials prepared as above described is carried out as described in our previous application, that is to say, material as herein described is cut up or formed into panels which are sewn or otherwise secured together, and the joint may be sealed by treatment with a suitable material which may be applied in liquid form in order to penetrate stitching holes.

BARRON & LEWIN,
Station Street Buildings, Huddersfield,
Agents for the Applicants.

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