Nov. 24, 1936. A. F. HECK 2,062,248

PROCESS OF MAKING BLADDERS FOR FOOTBALLS AND THE LIKE

Original Filed April 13, 1934 3 Sheets-Sheet 1

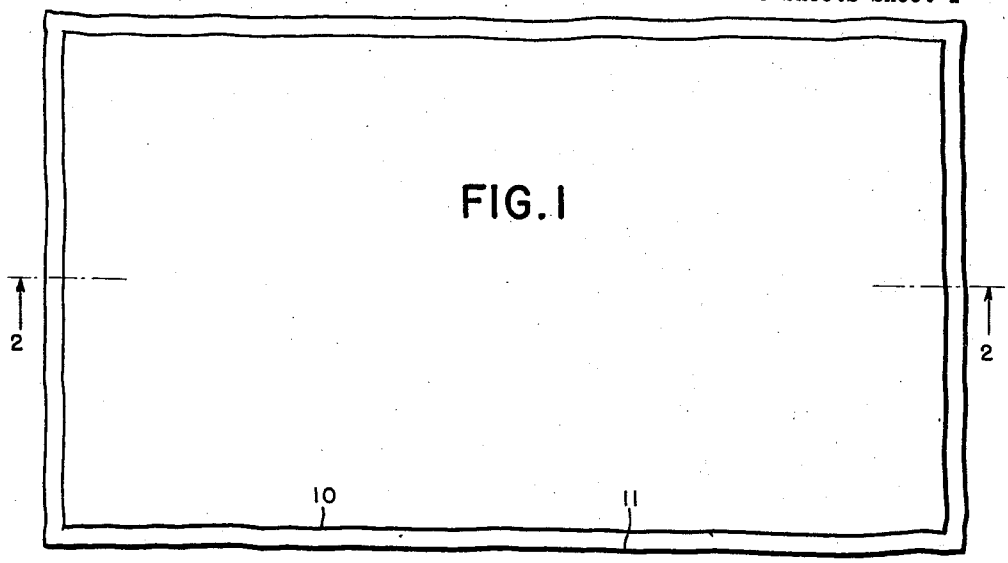


FIG. 1

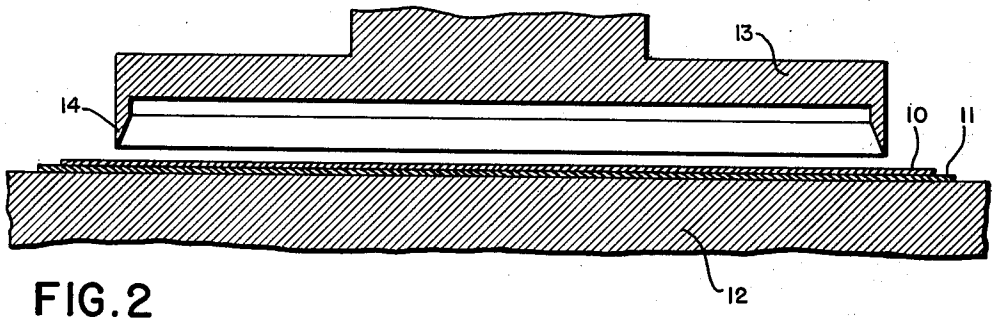


FIG. 2

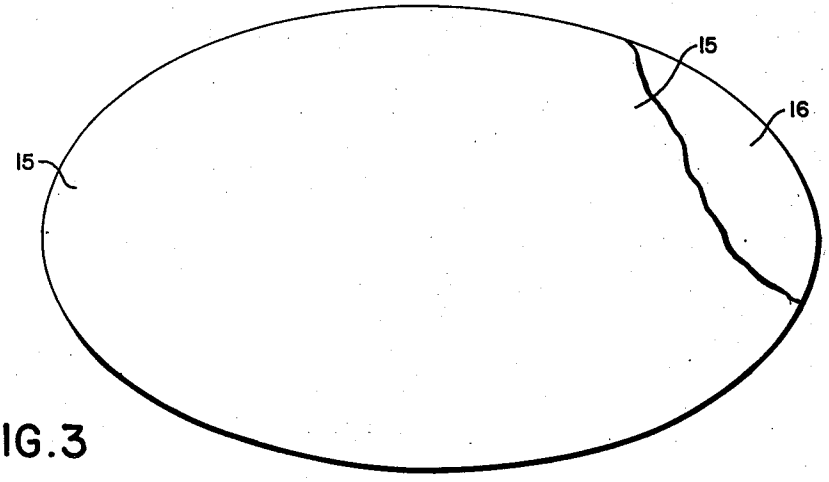


FIG. 3

INVENTOR
ALBERT F. HECK
BY Bohleber & Ledbetter
ATTORNEYS

Nov. 24, 1936. A. F. HECK 2,062,248

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FIG.4

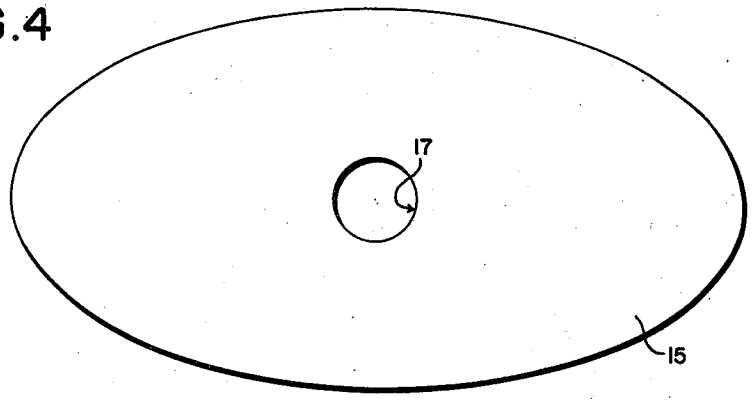


FIG.5

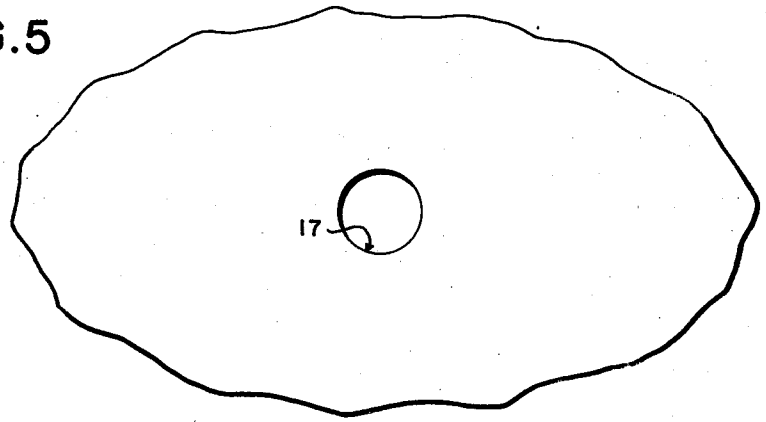
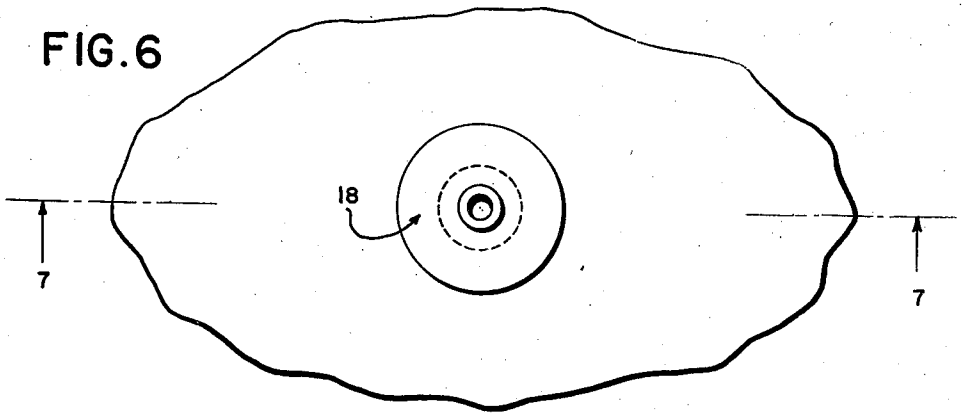


FIG.6



INVENTOR
ALBERT F. HECK
BY Bohlebers & Ledbetter
ATTORNEYS

Nov. 24, 1936. A. F. HECK 2,062,248

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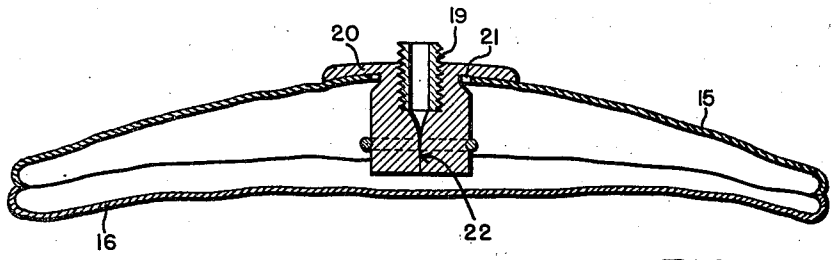


FIG. 7

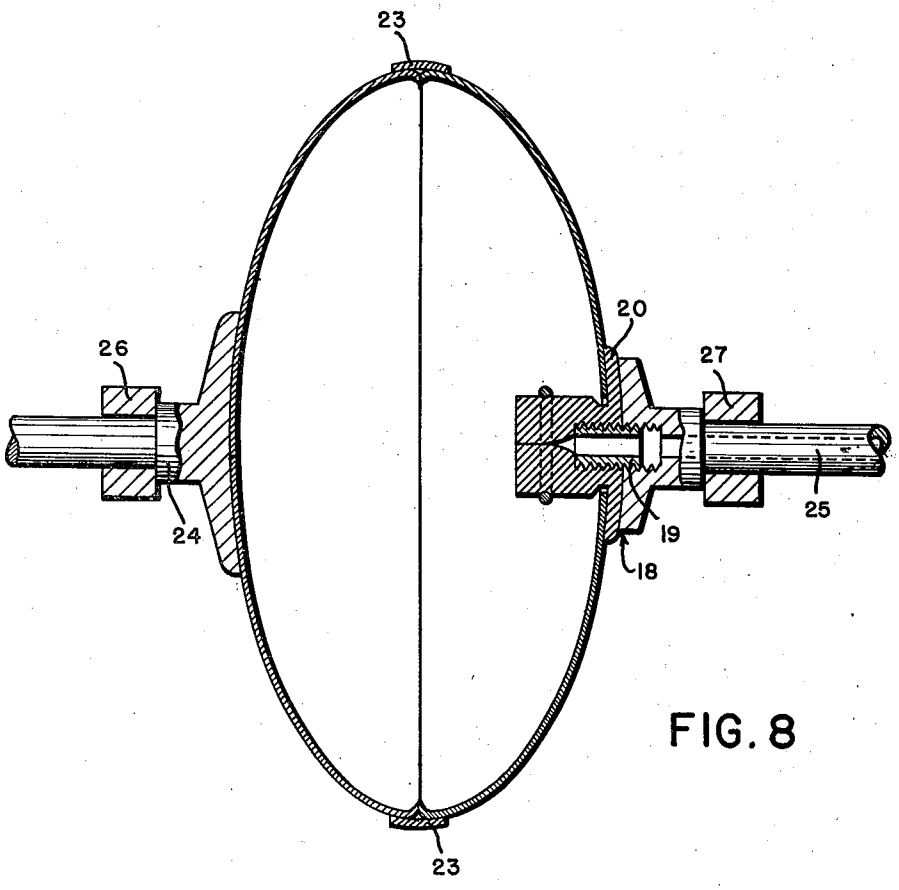


FIG. 8

INVENTOR
ALBERT F. HECK
BY Bohlebr + Ledbetter
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,062,248

PROCESS OF MAKING BLADDERS FOR FOOTBALLS AND THE LIKE

Albert F. Heck, Amsterdam, N. Y., assignor to The Collette Manufacturing Company, Amsterdam, N. Y., a corporation of New York

Original application April 13, 1934, Serial No. 720,498. Divided and this application November 30, 1935, Serial No. 52,352

8 Claims. (Cl. 154—42)

My invention relates to a bladder for footballs, basketballs, play balls and the like and the process of manufacturing same, and is a division of my copending application Ser. No. 720,498, filed April 13, 1934.

Heretofore difficulty has been encountered in applying to a rubber bladder the bladder inflation valve and also securing to the sections of a rubber bladder and over the seams thereof a rubber reinforcing tape to prevent rupture in the normal operation of the same. This invention is not only intended to overcome these difficulties but also to lessen very materially the cost of manufacture of rubber bladders by doing away, among other things, with the necessity of resorting to buffing, roughening and similar operations, as in the past, which are not only troublesome, but relatively expensive.

Insofar as the structure of the finished article itself is concerned, that will be readily understood from a detailed description of my process of manufacture of such article. To facilitate the description of my process and to enable the same to be more readily understood I have, as far as it is possible to do so, illustrated the various steps thereof on the drawings in the order in which these steps preferably occur in the actual practice of my process. Referring to the drawings:

Figure 1 illustrates two superimposed sheets of uncured rubber from which the bladder sections are stamped out.

Figure 2 illustrates diagrammatically a die for simultaneously stamping out and cut-seaming the blanks or sections from the sheets shown in Figure 1, it being understood that the mechanism for stamping out these sections may be so constructed as to stamp out any number thereof at the same time.

Figure 3 illustrates two sections of the bladder stamped out and cut-seamed from the sheets shown in Figure 1, and also illustrates the two sections of the bladder in condition to have their outer surfaces cured at this stage.

Figure 4 is a view similar to Figure 3 showing a perforation made in one of the sections to receive the body of the bladder inflation valve.

Figure 5 illustrates the sections of the bladder turned inside out through the bladder perforation to expose the uncured sides of the said sections. The general shape and configuration which the bladder assumes when turned inside out, due to the cut-seam which is now on the inside thereof, is also shown in this figure.

Figure 6 illustrates the bladder with the body of the bladder inflation valve inserted into the perforation and the annular rubber attaching flange thereof secured to the perforated section around the perforation therein in accordance with my invention.

Figure 7 is a section of the bladder and the bladder inflation valve taken on the line 7—7 of Figure 6.

Figure 8 illustrates the bladder partially inflated to round out the seam, and mounted in a suitable rotating holder, to facilitate and accelerate the application by suitable pressure to the surface of the bladder sections and over the seam thereof of a rubber reinforcing tape.

Referring to the drawings in detail and first to Figures 1 and 2 thereof, the reference numerals 10 and 11 designate two superimposed sheets of uncured rubber, just as they come from the calender machines. Any suitable means may be employed to prevent the superimposed sheets from sticking to each other. To enable blanks or bladder sections to be cut from these superimposed sheets any suitable support, such as that indicated by the reference numeral 12, is provided. The reference numeral 13 designates diagrammatically a die or other suitable form of cutter, equipped with a knife edge 14, for simultaneously stamping out and cut-seaming from the sheets 10 and 11 of sections 15 and 16 (see Figure 3) in the shape, for instance, of a football bladder. Only one die or cutter is illustrated, but it will be understood that any number of these dies or cutters may be employed to simultaneously stamp out a number of sections in sequence or at one and the same time. The knife edge 14 is preferably so shaped as to squeeze together and hermetically weld the edges of the uncured sections cut thereby. Furthermore, in order to provide a more uniform and more effective weld, the knife edge 14 should be preferably heated to a suitable temperature. Those skilled in the art will know what the shape of the cutting edge should be, as well as the temperature thereof to be maintained, in order to secure a proper weld and which becomes the seam of the two bladder sections which go to make up the bladder. It will therefore be appreciated from the foregoing that in the operation of the die 13, two sections are simultaneously cut from the sheets 10 and 11 and properly seamed. This operation of the die to simultaneously cut blanks or sections from sheets 10 and 11 is called "cut-seaming"; that is, after said operation the sections are said to be "cut-seamed".

The two sections stamped out and cut-seamed as described above, are illustrated in Figure 3.

After these sections are stamped out and cut-seamed, the outside surfaces of these sections are then cured in any suitable way, but preferably by means of acid fumes. It will be noted, however, that the inner sides of these sections are not accessible to the acid fumes and therefore remain in an uncured state. As these sections are hermetically sealed to each other there is no danger of the insides thereof being cured; hence they need not be used immediately after they are stamped from the sheets 10 and 11. In fact they may be stored for a reasonable length of time. The significance of this will appear from what follows.

When the two sheets of cured rubber are calendered suitable means, such as powder, is employed to prevent them from sticking after which one is superimposed upon the other and sections thereof are simultaneously "died" out to form a bladder having an air tight compartment between the two sections. When the bladder is subjected to acid fumes for curing the surface on the outside of the sections the acid fumes cannot come in contact with the inner surface of the sections, that is in contact with the inside of the bladder to cause a glazed surface which has to be buffed off to cause material to adhere to it. In this specification the word "uncured" refers to this condition on the inner surface of the sections. Where acid fumes are employed for the curing in the manner above described the curing only goes to a certain depth, at least it can be controlled in this respect so as to leave the inner sides of the sections uncured or only semi-cured, whereas in curing rubber by heat treatment the entire body of the rubber is cured.

After the outside of the bladder has been cured in the manner just described, the next step in the process is to provide a perforation 17 in one of the sections thereof, as illustrated in Figure 4, for the purpose of attaching a bladder inflation valve. However, before the bladder inflation valve is secured to said section, the sections of the bladder are turned inside out through the perforation 17 with the result that the cured surface of the sections of the bladder are now on the inside and the uncured surfaces are on the outside. The general shape assumed by the bladder itself after it has been turned inside out, as just described, is illustrated in Figure 5. It assumes this general contour or configuration because the projecting portion of the cut-seam is now on the inside and causes buckling.

After the bladder has been turned inside out, as described in the preceding paragraph, the next step of the process preferably consists in securing to the perforated section of the bladder the bladder inflation valve, as shown in Figures 6 and 7. This valve is generally designated in Figure 6 by the reference numeral 18 and comprises a stem 19 (see Figure 7) and an annular rubber flange 20 mounted upon the stem and adapted to serve as a means of permanently securing the valve to the bladder. On the inner end of the stem 19 is the valve proper 21, and the type illustrated comprises a rubber member having a normally closed opening 22 to prevent the exit of air from the interior of the bladder. Any suitable pumping means may be employed to inflate the bladder at will and in order to deflate the same it is only necessary to insert the proper shape of tool to expand the opening 22, as will be understood. Any form of bladder inflation valve may be employed, and I do not restrict myself to any particular type so long as it is equipped with an annular rubber or similar flange to enable it to be secured to the bladder.

After the body 21 of the bladder valve has been inserted into the perforation 17, the annular rubber flange of the bladder valve is then applied by suitable pressure to the uncured surface of the perforated section about the perforation thereof. Before the annular flange is applied to the bladder the zone around the perforation 17 is preferably cleaned, as by means of gasoline, of impurities. Any suitable cleansing fluid may be employed, but I find by the use of naphtha or gasoline on the uncured surface, said surface becomes quite clean and sticky, and therefore admirably adapted to cohere to the annular rubber flange 20. The side of the flange 20 facing the bladder is buffed and then coated with a suitable cement and when this cemented surface is pressed against the cleaned uncured surface of the bladder, an air-tight, durable weld is effected between said flange and the outer surface of the bladder. Cement may also be applied, if desired, on the uncured surface of the bladder as well as on the flange.

Insofar as the application of the bladder valve to the bladder itself is concerned, the process is complete at this stage, but it is equally desirable, as heretofore stated, to provide the seam of the bladder with suitable reinforcing means. Therefore the next step, to be described, consists in applying a reinforce 23 to the cut-seam of the bladder. Bearing in mind that the outer surface of the bladder is uncured, the bladder is now partially inflated, as shown in Figure 8, in order to round out the seam from the shape it assumes when the bladder is completely deflated as illustrated in Figure 6. After being partially inflated, the bladder is inserted, or mounted, in work holders 24 and 25 mounted in suitable trunnions 26 and 27 and adapted to be rotated, either manually or mechanically, not only to facilitate the cleaning of the uncured surface adjacent the seam, but also in applying by suitable pressure to said cleaned uncured surface of said sections and over the seam thereof, the uncured side of the rubber reinforcing tape 23. The seam may be rounded out by means other than partially inflating the bladder.

From the foregoing it will be seen that I have devised a process which comprises cut-seaming from two superimposed sheets of uncured rubber, two sections thereof in the shape of a bladder, curing the outside surfaces of the bladder sections, so cut-seamed, perforating one of said sections and turning said sections inside out through the said perforation to expose the uncured sides of said sections. Thereafter the bladder inflation valve 18 is preferably secured to the bladder and, specifically stated, this comprises the cleaning of a zone of the uncured surface of the perforated section around the perforation therein, inserting into said perforation the body 21 of the bladder valve, which bladder valve is equipped with an annular rubber attaching flange 20 having cement coated on the side thereof facing the bladder, and then securing the cemented side of said rubber flange by suitable pressure to said cleaned uncured zone of said section. My process, as it will be seen from the foregoing, also contemplates the steps of reinforcing the seam of the bladder and this, specifically, comprises cleaning the uncured surface of the sections adjacent the seam as by naphtha or gasoline and then applying by suitable pressure to said uncured surface of said sections and over the seam thereof, the uncured side of a rubber reinforcing tape 23. This makes

a very effective weld between the reinforcing tape and the bladder. In lieu of employing a rubber reinforcing tape one side of which is uncured, I may employ a rubber tape, both sides of which are cured but in that event it will be necessary to buff one side of the tape and to employ a suitable rubber cement or other cohesive means on the buffed side of the tape to effect a proper securing means between said tape and the uncured surface of the sections about the seam of the bladder.

It makes no difference in the practice of my process of applying the tape 23 what type or kind of valve 18 is employed nor how the same is secured to the bladder. Furthermore the valve 18 need not necessarily be secured to the bladder until after the tape is applied.

From the foregoing it will be seen also that I have devised a bladder for a football and the like which comprises two cut-seamed rubber sections and a reinforce for said seam comprising a rubber tape attached to said sections over said seam by means of cohesion between uncured surfaces of said sections and the uncured or buffed cemented side of a tape facing said sections.

I have also devised a bladder for a football or the like which comprises a valve equipped with an annular flange and through which valve said bladder is adapted to be inflated, said rubber flange being secured, in fact, welded, to said bladder by means of the cohesion between an uncured zone of said bladder around the perforation therein and a suitable cement on the buffed side of said flange facing the bladder.

It will also be seen from the foregoing, and as clearly illustrated in Figure 7, that by attaching the bladder inflation valve to the bladder in the manner hereinbefore described it is unnecessary to provide any means within the walls of the bladder cooperating with the body of the valve to secure the valve in place. In other words, the valve is not secured in any fashion to the inner wall of the bladder.

After the bladder valve has been secured to the bladder in the manner hereinbefore indicated and before the bladder has been partially inflated to tape the seam thereof, it is permitted to dry, and I find that about an hour's time is suitable for this purpose. A little time should also be given to enable the reinforce to dry after its application. Furthermore the exposure to the atmosphere of the uncured outside surface of the bladder will, in a short length of time, cause said surface to become cured to the extent necessary for its use in devices of this kind.

The tape employed to reinforce the cut-seam (sometimes called the "edge") of the bladder is preferably cut from the same sheets from which the bladder sections are stamped.

It will be understood that many changes may be made in points of detail and other modifications resorted to without deviating from the true scope and spirit of my invention.

What is claimed is:

1. The process of manufacturing a bladder for footballs and the like, which comprises cut-seaming from two superimposed sheets of uncured rubber two sections thereof in the shape of a bladder, curing the outside surfaces of the sections so cut-seamed, perforating one of said sections, turning said sections inside out through said perforation to expose the uncured sides of said sections, and then applying by suitable pressure to said uncured surface of said sections and over the seam thereof a rubber reinforcing tape.

2. The process of manufacturing a bladder for footballs and the like, which comprises cut-seaming from two superimposed sheets of uncured rubber two sections thereof in the shape of a bladder, curing the outside surfaces of the sections so cut-seamed, perforating one of said sections, turning said sections inside out through said perforation to expose the uncured sides of said sections, attaching a bladder valve in said perforation, inflating said bladder sufficiently through said valve to round out said seam, and then applying by suitable pressure to said uncured surface of said sections and over the seam thereof a rubber reinforcing tape.

3. The process of manufacturing a bladder for footballs and the like, which comprises cut-seaming from two superimposed sheets of uncured rubber two sections thereof in the shape of a bladder, curing the outside surfaces of the sections so cut-seamed, perforating one of said sections, turning said sections inside out through said perforation to expose the uncured sides of said sections, attaching a bladder valve in said perforation, inflating said bladder sufficiently through said valve to round out said seam, slowly rotating said bladder while partially inflated, and while rotating said bladder applying by suitable pressure to said uncured surface of said sections and over the seam thereof a rubber reinforcing tape.

4. The process of manufacturing a bladder for footballs and the like, which comprises cut-seaming from two superimposed sheets of uncured rubber two sections thereof in the shape of a bladder, curing the outside surfaces of the sections so cut-seamed, perforating one of said sections, turning said sections inside out through said perforation to expose the uncured sides of said sections, cleaning the surface of said sides adjacent said seam, and then applying by suitable pressure to said cleaned uncured surface of said sections and over the seam thereof the uncured side of a rubber reinforcing tape.

5. The process of manufacturing a bladder for footballs and the like, which comprises cut-seaming from two superimposed sheets of uncured rubber two sections thereof in the shape of a bladder, curing the outside surfaces of the sections so cut-seamed, perforating one of said sections, turning said sections inside out through said perforation to expose the uncured sides of said sections, attaching a bladder valve in said perforation, inflating said bladder sufficiently through said valve to round out said seam, cleaning the surface of said sides adjacent said seam, and then applying by suitable pressure to said cleaned uncured surface of said sections and over the seam thereof the uncured side of a rubber reinforcing tape.

6. The process of manufacturing a bladder for footballs and the like, which comprises cut-seaming from two superimposed sheets of uncured rubber two sections thereof in the shape of a bladder, curing the outside surfaces of the sections so cut-seamed, perforating one of said sections, turning said sections inside out through said perforation to expose the uncured sides of said sections, attaching a bladder valve in said perforation, inflating said bladder sufficiently through said valve to round out said seam, cleaning the surface of said sides adjacent said seam, slowly rotating said bladder while partially inflated, and while rotating the bladder applying by suitable pressure to said cleaned uncured surface of said sections and over the seam thereof the uncured side of a rubber reinforcing tape.

7. The process of manufacturing a bladder for footballs and the like, which comprises cut-seaming from two superimposed sheets of uncured rubber two sections thereof in the shape of a bladder, curing the outside surfaces of the sections so cut-seamed, perforating one of said sections, turning said sections inside out through said perforation to expose the uncured sides of said sections, inserting into said perforation a bladder valve having an annular rubber attaching flange secured thereto, and then applying said rubber flange by suitable pressure to said uncured surface of said sections and about the perforation thereof.

8. The process of manufacturing a bladder for footballs and the like, which comprises cut-seaming from two superimposed sheets of uncured rubber two sections thereof in the shape of a bladder, curing the outside surfaces of the sections so cut-seamed, perforating one of said sections, turning said sections inside out through said perforation to expose the uncured sides of said sections, cleaning a zone of the uncured surface of the perforated sections around the perforation therein, inserting into said perforation a bladder valve equipped with an annular rubber attaching flange having cement on the side thereof facing the bladder, and then securing the cemented side of said rubber flange by suitable pressure to said cleaned uncured zone of said section.

ALBERT F. HECK.