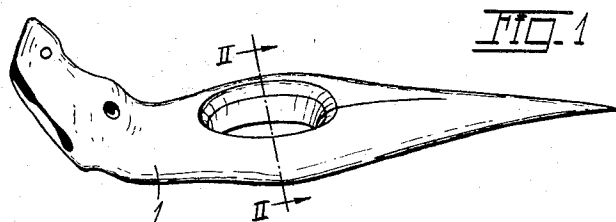
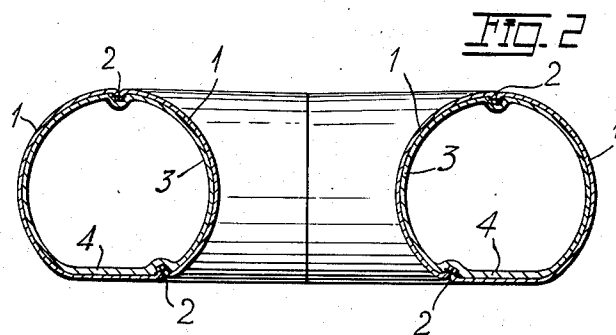
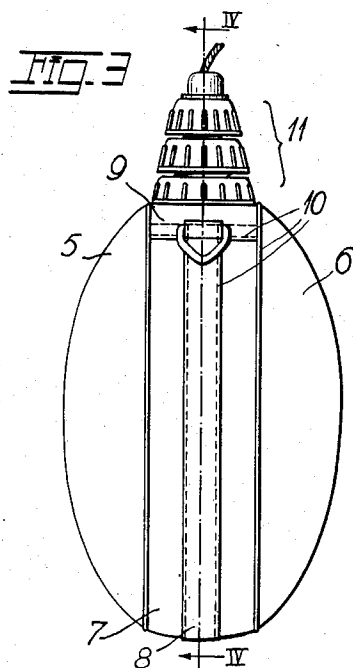
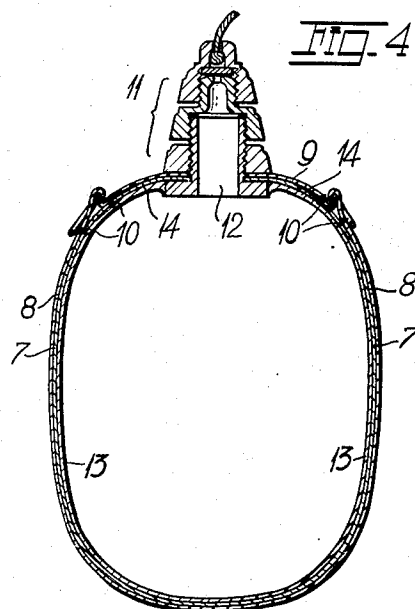


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METHOD OF RUBBERIZING HOLLOW
ARTICLES OF FIBROUS MATERIAL
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METHOD OF RUBBERIZING HOLLOW
ARTICLES OF FIBROUS MATERIAL

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The invention relates to a method of waterproofing hollow articles made of fabric, such as receptacles, hot water bottles, floats, rafts, lifeboats, camping and beach mattresses, water toys, balloons, and the like.

Heretofore, such articles have been made from sheets or lengths of fabrics rubberized on one or both sides, or otherwise waterproofed by cutting the proofed fabric to suitable pieces and joining them by cementing or vulcanizing, or also by sewing the pieces together whereby the seams are then coated with rubber strips cemented or vulcanized thereon.

This method of manufacture presents, among others, the following drawbacks:

(1) Cementing or vulcanizing is a very slow and uneconomic procedure as it requires many manipulations by hand;

(2) The rubberized fabrics which have been secured together by cementing or vulcanizing come readily apart again, whereby the article loses its impermeability;

(3) If the article has been made by sewing together two or more pieces of fabric and the seam has been protected by a rubber strip, the procedure requires again much manual work and the rubber strip becomes easily loose so as to destroy the impermeability of the article.

It has also been proposed to rubberize certain hollow articles composed of fibrous material, such as tubes, hose, and the like, by filling them with a water dispersion of rubber and withdrawing the water through the fibrous material by suction applied from the outside until a desired thickness of insoluble constituents has been deposited from the water dispersion on the inner wall of said articles, whereupon the rest of the rubberizing dispersion is poured out and the article is dried, or if desired, vulcanized.

This latter process is only applicable to tubes or hose of relatively small diameters but not to articles of larger sizes and/or irregular shape, as it is generally not possible to fill the inside of such articles completely with the waterproofing composition and proceed as described for the proofing of hose.

It is a principal object of the present invention to provide a process which permits of a quick and efficient waterproofing of all kinds of hollow articles made from permeable textile fabrics.

Other objects and advantages will be apparent from a consideration of the specification and claims.

My method allows of making hollow articles in the conventional manner by sewing together

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suitably cut pieces of fabric; the hollow article is waterproofed only after it has been completed, which has the advantage that not only the fabric itself but also the seams uniting the various pieces of the fabric become impermeable.

According to the invention, hollow articles made of fabric or composed of fibrous material, such as receptacles, water bottles, floats, lifeboats, rafts, cushions and mattresses, aquatic toys, balloons, and the like, are filled with a predetermined amount of a vulcanizable or partially or completely vulcanized aqueous rubber dispersion; subsequently, the article is inflated and turned in the inflated state for a time necessary to secure the desired distribution of the rubber dispersion. By turning the article, either by hand or mechanically, the whole inner wall of the article will be coated uniformly by a layer of the dispersion; by holding then the article in one or more fixed positions, a coating of greater thickness can be obtained on the corresponding parts of the inner wall. Subsequently, part of the air is let out and a coagulating gas, for instance carbon dioxide, is introduced under slight pressure through the admission opening. This causes a quick and complete coagulation of the rubber dispersion, the expulsion of the serum through the pores and interstices of the fabric, and the adhesion of the insoluble constituents of the dispersion on the inner wall of the treated article so as to prevent running of the deposited layer and variations in its thickness. Finally, the article is placed in an oven for drying and/or vulcanization and gradually heated to a temperature of 40° to 80° C. or more, as required for the vulcanization, while maintaining the gas pressure inside the article which will also gradually increase in conformance with the increase of the temperature. After the article has been dried, for instance when a vulcanized rubber dispersion has been used for impregnation, or after the vulcanization has been completed, the gases are let out. If the hollow article is a container or bag for food, it is washed and dried again.

The rubber dispersion may be a vulcanizable or wholly or partially vulcanized natural or synthetic latex, which may contain conventional fillers, antioxidants and other ingredients.

Before the rubber dispersion is poured into the hollow article, the outer walls of the article may be moistened with water or coated with a solution which closes or contracts the pores and interstices of the fabric, such as fish glue or water glass. Such preliminary treatment pre-

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vents the insoluble constituents of the rubber dispersion from passing through the fabric to the outside when the water or serum of the dispersion is withdrawn.

The injection of carbon dioxide produces a quick and complete coagulation of the latex deposited on the inner wall of the treated articles. The fact that the distribution of the latex, as well as the drying or vulcanization, takes place when the hollow article is inflated under pressure, ensures that the inner coating is completely smooth and wrinkle-free.

For a more complete understanding of the invention, reference should now be had to the drawing, in which:

Fig. 1 is a perspective view of an aquatic toy;

Fig. 2 is, on a larger scale, a cross section taken along line II—II of Fig. 1;

Fig. 3 is a front view of a foldable container for liquids, and

Fig. 4 is a section along line IV—IV of Fig. 3.

With reference to Figs. 1 and 2 of the drawing, in the manufacture of an aquatic toy embodying the present invention, suitably cut pieces 1 of a textile fabric are first sewn together by seams 2. The fabric used can be of any convenient kind, though I prefer to use close-woven fabrics.

At an appropriate place of the toy, a valve is provided through which a water dispersion of rubber is introduced, which may have the following typical composition (the amounts given by weight):

	Parts
Rubber latex (60%)	1000
Zinc oxide	60
Kaolin	60
Piperidylthiocarbamyl piperidine	15
Antioxidant	6
Water	120
Ammonia (20%)	2

In order to calculate the amount of the dispersion to be used, I determine first the inner surface of the article to be treated. If it be assumed that that inner surface shall be coated with a uniform layer of 1 mm. thickness, 16 ccm. of said rubber dispersion are to be used for every square decimeter. If the thickness of the coating shall be, wholly or in part, greater, I have to increase accordingly the quantity of the dispersion used.

After the necessary amount of the waterproofing rubber composition has been introduced, the article is inflated by air, the valve is closed and the toy is turned around so as to secure a uniform distribution of the composition over the inner surface. This operation may be carried out within a few minutes by hand or mechanically. Assuming now that the lower part of the toy should receive a coating of greater thickness than the upper part, it is allowed to rest on its base for some more minutes. Subsequently, part of the enclosed air is allowed to escape and carbon dioxide is injected under pressure in order to cause coagulation of the composition deposited on the inner surface. Finally, the toy in its inflated state is brought into a vulcanization chamber wherein it is gradually heated to a temperature of 40 to 80° C. and where it remains until the inner coating is completely vulcanized. After the vulcanization is completed, the toy is taken out of the chamber, the gas is let out, and talcum is injected as a preserving agent, whereupon the article is ready for sale.

The toy treated in the described manner has

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an inner rubber coating 3 (Fig. 2) which proofs not only the fabric but also the seams 2, and which at any desired place, for instance at its base, may be of increased thickness, as indicated by the reference numeral 4 in Fig. 2.

In Figs. 3 and 4 a flexible container or bottle for liquids is shown, which is made by sewing together by seams 10 pieces 5, 6, 7, 8, and 9 of a suitable fibrous fabric. The container is closed at its top by a screw-cap 11 which is provided with an opening 12 for filling and emptying the same. Special inlet and valve means may be provided for facilitating the introduction of gases under pressure and their removal through said opening. It may be assumed that the container has an inner surface of 720 cm.², that a rubber coating 13 of 1 mm. thickness shall be applied thereto for its proper waterproofing, and that the upper part formed by the piece 9 shall be coated with a layer 14 of 2 mm. average thickness in order to impart to that part the stiffness necessary to support the cap 11. Therefore, 125 g. of the above specified composition will be necessary for waterproofing each container of that size. The waterproofing procedure is similar to that described above with respect to the aquatic toy. The rubberizing composition is introduced in the container, which is then inflated with air and closed. After the closed container has been turned around for several minutes for an even distribution of the composition, it is hung up, upside down, and gently shaken so that the composition not yet adhering to the inner wall is deposited on the piece 9 and forms thereon a coating 14 of greater thickness. Subsequently, the bottle is opened to release part of the enclosed air and carbon dioxide is injected under pressure. Then the container is placed upside down in a vulcanization chamber and treated in the same way as described hereinbefore with respect to the aquatic toy.

After the vulcanization is completed, the container is opened to let out the gas, rinsed and dried, whereupon talcum is introduced to protect and preserve the inner coating during storage.

Though the invention has been described only with respect to two specific embodiments, it will be obvious to those skilled in the art that it can be applied to all hollow articles made of fibrous material, whatever their size or shape. When the articles are not comprised of close-woven fabrics, it is useful to precede the waterproofing treatment of the inner walls of the articles by a moistening of the outer walls with water, fish glue, water glass or similar compositions which contract the pores, in order to allow the subsequent inflation of the article with air in the rubberizing process. Various modifications of the invention will be apparent, and it is not desired to limit the inventions otherwise than as is required by the state of the art.

What I claim is:

1. A method for rubberizing the inner walls of hollow articles made of permeable fibrous material having pores and interstices comprising the steps of filling the hollow article with a predetermined amount of an aqueous rubber dispersion, inflating the article, closing it, turning the inflated article to cause the desired distribution of the rubber dispersion on the inner walls, opening the article and injecting carbon dioxide gas under pressure, thereby causing coagulation of the rubber dispersion deposited on the inner walls and forcing the dispersing medium under pressure outwardly through the pores of the fibrous

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material, and then heating the article while maintaining the inner gas pressure.

2. A method for rubberizing the inner walls of hollow articles made of permeable fibrous material having pores and interstices comprising the steps of filling the hollow article with a predetermined amount of an aqueous rubber dispersion, inflating the article, closing it, first turning the inflated article to cause substantially uniform distribution of the rubber dispersion on the inner walls and then keeping it in a substantially fixed position causing said dispersion to accumulate on certain lowermost situated parts of the inner walls, opening the article while in said fixed position and injecting carbon dioxide gas under pressure, thereby causing coagulation of the rubber dispersion deposited on the inner walls and forcing the dispersing medium under pressure outwardly through the pores of the fibrous material, and then heating the article in substantially the same position as maintained for accumulating the rubber dispersion while maintaining the inner gas pressure.

3. A method for rubberizing the inner walls of hollow articles made of permeable fibrous material having pores and interstices comprising the steps of moistening the outer walls of a hollow article, filling it with a predetermined amount of an aqueous rubber dispersion, inflating the article, closing it, turning the inflated article to cause the desired distribution of the rubber dispersion on the inner walls, opening the article and injecting carbon dioxide gas under pressure, thereby causing coagulation of the rubber dispersion on the inner walls and forcing the dispersing medium under pressure outwardly through the pores of the fibrous material, and then heating the article while maintaining the inner gas pressure.

4. A method for rubberizing the inner walls of hollow articles made of permeable fibrous ma-

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terial having pores and interstices comprising the steps of coating the outer walls of a hollow article with a composition contracting the pores of the fibrous material, filling it with a predetermined amount of an aqueous rubber dispersion, inflating the article, closing it, turning the inflated article to cause the desired distribution of the rubber dispersion on the inner walls, opening the article and injecting carbon dioxide gas under pressure, thereby causing coagulation of the rubber dispersion deposited on the inner walls and forcing the dispersing medium under pressure outwardly through the pores of the fibrous material, and then heating the article while maintaining the inner gas pressure.

5. A method for rubberizing the inner walls of hollow articles made of permeable fibrous material having pores and interstices comprising the steps of filling the hollow article with a predetermined amount of a water dispersion of rubber, inflating the article with air, closing it, turning the inflated article to cause the desired distribution of the rubber dispersion on the inner walls, opening the article and releasing part of the air, injecting carbon dioxide gas under pressure, thereby causing coagulation of the rubber dispersion deposited on the inner walls and forcing the water under pressure outwardly through the pores of the fibrous material, and then vulcanizing the article while maintaining the inner pressure.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,805,245	Hopkinson et al.	May 12, 1931
1,956,722	Kennedy	May 1, 1934
2,208,868	Kraft	July 23, 1940
2,355,084	Kurrle	Aug. 8, 1944
2,391,477	Phillips	Dec. 25, 1945