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PCT/MX 00/00042

200202480-0

IMPROVED PROCESS FOR MANUFACTURING BALLS FROM LAMINATED MATERIALS

The invention, subject matter of the present application, is related to an improved process for manufacturing balls from laminated materials. The improved process eliminates from the traditional process about 50 percent of the personnel employed in several manufacturing steps or stages of said products, and still obtaining up to 3 times higher production yield in 8-hour shifts. The foregoing results in savings on labour force involved in said process and a significant higher production. As a consequence, this obviously produces higher profits. However, this improved process does not demerit the product's quality. The product is, generally speaking, both in the traditional process and in the new process, manufactured through a roto-moulding process.

A purpose of every corporation is to obviate its production line with the aim of attaining its production targets with lower costs. In order to reach this goal a specialised research and capacity to develop or improve processes is required; specific knowledge in the corresponding field is also required. Lots of working hours, lab-tests, equipment modifications, time and movement analysis, additional expenses in production line modernisation, and many other considerations are applied, but, at best, these would produce labour savings not greater than 15 to 25% and a production that could be considered optimised from 10 to 15%.

Taking into account that with the process of the present invention, practically 50% savings have been attained in labour employed manufacturing the product and a 3 fold increment in manufacturing said product, this necessarily means that the process, subject of this application, presents distinctive characteristics from the former processes for manufacturing balls from laminated materials.

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As background of the instant process, Mexican Patent No. 163049, issued to the inventor of the present application, generally refers to a process for manufacturing a foamed-PVC ball, with raw material's savings as the main purpose, and also making said ball lighter, without sacrificing its resistance and utility features. These balls are manufactured with a traditional roto-moulding process, the improvements of the process being particularly the sequence of steps and the observed operation conditions. Obviously, the product improvements consist in the features of the ball walls acquired from being conformed by foamed PVC.

Another background that could be considered as forming part of prior art for this invention, is the Mexican Patent No. 164053, in which an improved roto-moulding process is claimed, for decoration or ornamentation of inflated items, the particular characteristic of which is the addition to plastisol, before subjecting the material to the corresponding moulding temperatures, of a predetermined quantity of small beads densely coloured, in different tones, which gives to the product, i.e., the walls of the ball, a decoration based on small spots randomly distributed all around the surface body of the ball, providing the ball an attractive finishing and decoration.

From the processes claimed in the above-mentioned patents, it could be inferred that up to date and before the process developed by the applicant, ball-manufacturing technique has suffered almost negligible changes, constrained to the use of new materials that have been developed. Before these improvements no different procedure was engineered entailing the advantages obtained by the process of the invention. These advantages result in a highly competitive process, both in equipment investment and the value obtained in production, and in less number of personnel employed in its implementation.

Therefore, it is an object of this invention to perform an improved roto-moulding process

for manufacturing balls with laminated outer-surface, which production stages have been obviated without having an effect on the quality of the finished product.

A further object of the invention is a process for manufacturing laminated balls, with a highly increased productivity level resulting in high-quality laminated balls.

A still further object of the invention is to carry on a process for manufacturing laminated balls in which a lesser number of equipment of production is used.

A further object of the invention is an improved process for manufacturing laminated balls, the implementation of which will be reflected in a decreased cost of the obtained product, particularly derived from decreasing the number of workers employed in its manufacturing, the high percent increase of productivity, and low investment in equipment employed.

These and other objectives will be clearly derived from the following detailed disclosure of the inventive process and even other objectives not contemplated above.

With the purpose of weighting the differences of the instant process against those of the state-of-the-art process for manufacturing balls from laminated materials, a summary of steps or stages of the traditional process is described as follows:

(1) Blending by friction, at a predetermined temperature range depending on the nature of the employed raw material, rubber and vulcanising agents components in a roller mill.

(2) Subjecting said blend of raw material, previously mixed, to a calender step, with the purpose of obtaining a smooth and continuous laminated paste.

(3) Trimming or swaging the smooth and continuous sheet, in order to obtain four sections, which joined by their edges make up the ball-body template,

bonding to the same the female piece of the inflation valve.

(4) Introducing said template in a hot spherical mould, injecting pressurised air and increasing its temperature for a time sufficient for obtaining the vulcanisation of the template and until said template takes the characteristic spherical shape of a ball.

(5) Subjecting subsequently the vulcanised bladder obtained from the former step to a winding step with a resistant filament or thread, which is homogeneously distributed around all the bladder surface in a predetermined number of circumvolutions.

(6) Coating the vulcanised and threaded (tacked) bladder of the prior step, with a non-vulcanised rubber layer, placing two hemispheres that cover the coiled surface; and subsequently subjecting the bladder to a second step or stage of vulcanisation at high temperature and applying an adhesive layer to the outer surface of the second layer of rubber.

(7) Coating the second rubber layer with adhesive and placing over the same, according to a predetermined template, the panels or sections of laminated materials and place again said ball with the laminated pieces placed on its outer surface in a hollow mould for exterior finishing, the design of which will correspond to the intended design of the ball's exterior surface; and

(8) Deflating the ball and removing the product thus completed from the corresponding hollow mould.

To carry on the various stages above mentioned for manufacturing a laminated ball through the traditional process, a great quantity of equipment is necessary, the cost and operation of which increase the cost of the product, decreasing, thus, the profits from selling the product.

The equipment used for manufacturing balls from laminated materials through the traditional process could be summarised as follows: steam boiler;

compressor, blender (bamburi); cutting guillotine; two roller mills, one for masticate and one for mixing; rolling calender; hydraulic press, swages for knocking-out templates; moulds for bladder vulcanising; winder for thread or filament; moulds for vacuum forming the ball shell; moulds for vulcanising the threaded bladder; loop sander and washing tank; conveyor oven to apply steam-heated adhesive; final vacuum mould for application of external panels of the laminated ball.

To operate all the above listed equipment, 21 workers are required, who, in optimal conditions, would produce 800 finished pieces in an 8-hour shift.

The above mentioned process that belongs to prior art, must be catalogued as a high temperature and high pressure vulcanising process, which needs additional equipment able to generate the required temperatures and pressures for manufacturing the balls from laminated materials.

Now, the novel process of the invention is a room temperature process, highly simplified, that allow us to catalogue it as a high performance process, since a number of stages and the use of diverse equipment are saved. Reduction of necessary workers is remarkably notorious at each stage of said process.

The improved process, subject matter of the present application, comprises the following steps:

(1) Forming through a standard roto-moulding process a hollow sphere which will make up the bladder or body of the ball, from a thermoplastic or thermosetting material, providing to the bladder a sufficient air volume until said bladder reaches an exact outer gauge, thereby providing to it the desired weight and diameter, and including in the same roto-moulding step the female valve for inflating the ball.

(2) Winding the inflated body of the bladder with a filament or thread, homogeneously distributing said winding on the bladder surface and coating the external

winded thread with adhesive.

(3) Covering with panels or sections of a predetermined material and design the external body of the ball.

(4) Introducing within a spherical mould the ball covered by the panels or sections at room temperature.

(5) Closing the mould under pressure and inflating the ball with sufficient pressure in order to project the ball body walls towards the inner face of the moulds, obtaining thereby a proper adherence of the panels or sections on the ball body; and

(6) Take the air out from inside the ball and remove the ball from the moulds, obtaining the finished product.

As it was mentioned before, in the several stages of the new process, subject matter of this application, 13 operators are employed, being able to produce up to a total of 3000 balls per each 8-hours shift. A great benefit is obtained carrying on the inventive process.

The equipment used in carrying on the inventive process, which is a manufacturing process for balls from laminated materials, can be briefly summarised as follows: roto-moulding apparatus, compressor, winding device, conveyor for adhesive application, and a vacuum mould for fixing external panels to the ball's body.

Considering the above paragraph, it is clearly notorious the decrease of number of equipment used for manufacturing laminated balls, according to the inventive process, contrasted to the equipment used in the traditional process for manufacturing vulcanised balls.

From the above, it should be concluded that every objective originally stated has been accomplished and, being obvious that the inventive process can be

object of changes or modifications in its diverse stages, it is intended that these are considered as forming part of the present application, whenever they fall within the scope and spirit of the instant invention.

CLAIMS

1. Improved process for manufacturing balls from laminated materials, comprising forming through a roto-moulding process, a hollow sphere that configures the ball bladder or body, from a thermoplastic or thermosetting material, mounting at this stage the female valve for inflating the ball; characterised by the steps of winding said bladder previously inflated up to a desired diameter with a resistant thread or filament; covering with panels or sections of a predetermined material and design the outer surface of the bladder, which has been previously coated with adhesive; introducing the previously coated bladder with the panels or sections in a spherical mould for a predetermined time, providing to said bladder a sufficient air pressure for projecting the body of the bladder against the mould walls in order to propitiate the proper adherence of said panels to the bladder body and, take the air out from the ball thus manufactured and remove the ball from the corresponding moulds.

2. The process according to claim 1, wherein the moulds used for fixing the panels or sections which configure the laminated ball, present in their inner face a design according to the configuration and design of said panels or sections, embossing at this step of the process, the corresponding design on the ball from laminated materials.

3. The process according to claim 1, wherein the winding of resistant thread or filament on the outer surface of said bladder is evenly distributed all around the bladder's body.