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PROCESS FOR MAKING BOWLING PINS

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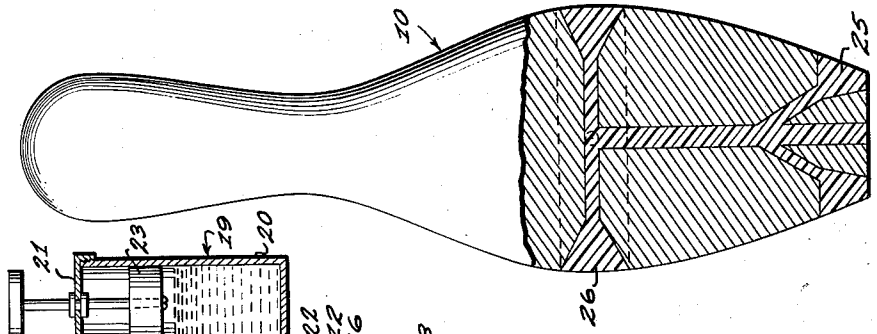


FIG. 5

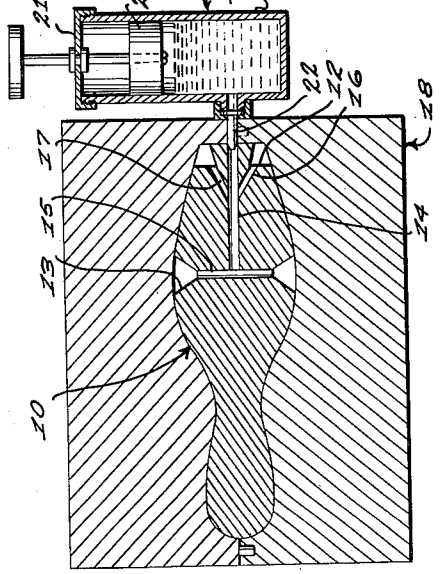


FIG. 4

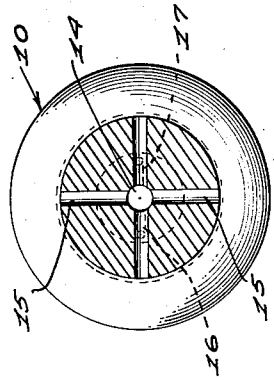


FIG. 3

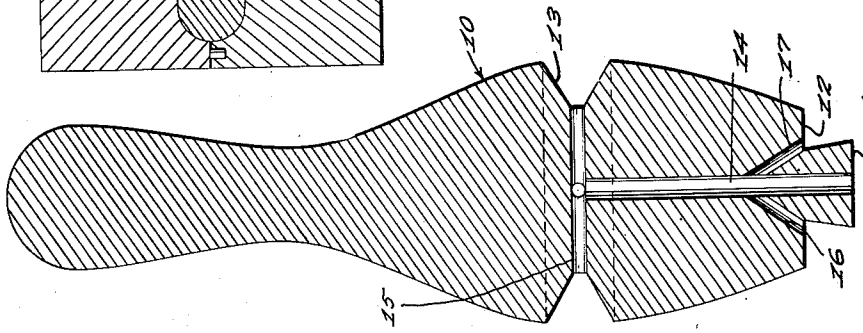


FIG. 2

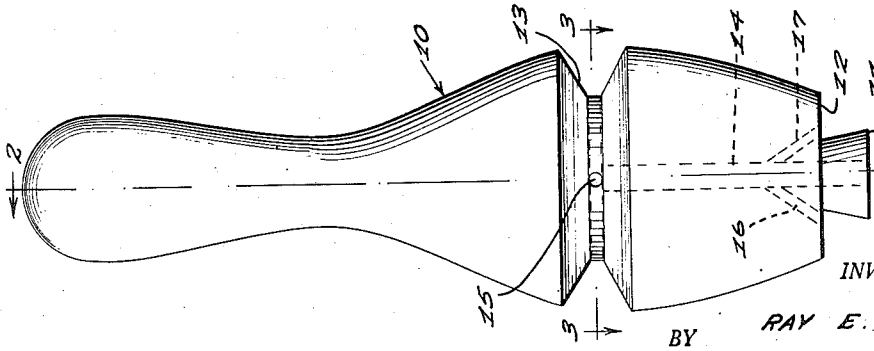


FIG. 1

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PROCESS FOR MAKING BOWLING PINS

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3 Claims. (Cl. 18—59)

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This invention relates to a process for making bowling pins.

Bowling pins made entirely of wood when subjected to the impacting action of bowling balls are caused to be forcibly thrown against the hard wood of the alleys. This battering of the pins against the alleys soon results in the pins becoming nicked and gouged, especially at and around their bottom standing surface or base, thus making it difficult and often impossible to stand such worn pins upright on the alley surface. Worn pins due to such wear become unbalanced and are, therefore, obnoxious to bowlers. In addition, the bowling pins along the region of bowling ball impact in a comparatively short time of use show a marring or breaking away of the grain surface, necessitating the renovation of the pins, namely, turning, then sanding, and finally painting. After the bowling pins have undergone several of such renovations they become so small in circumference as to fall through the pin setting machines, thereby being no longer usable.

An object of the present invention is to provide a process for making a wooden bowling pin having a band extending about the periphery of the pin at substantially the region of impact of a bowling ball therewith, the band being fabricated of impact resistant material.

Another object of the present invention is to provide a process of making a wooden bowling pin having a base and a band extending about the periphery of the pin at substantially the region of impact of a bowling ball therewith, the base and band being fabricated of impact resistant material.

A further object of the present invention is to provide a process of making a wooden bowling pin having a base and a band spaced from the base fabricated of impact resistant material which is simple in execution and highly efficient.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawing, wherein:

Figure 1 is a side elevational view of a typical bowling pin showing the undercutting of the base and the annular groove and communicating bores prior to the subjection of the pin to a molding operation with a moldable plastic material settable upon heating.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a side elevational sectional view of a two part mold having the bowling pin of Figure 1 mounted therein, with the ejection mechanism containing a charge of the moldable plastic material settable upon heating in position to effect the injection stroke.

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Figure 5 is a side elevational view, partly in section, of a bowling pin having the base and band of impact resistant material formed by the process of the present invention.

In carrying out the process of the present invention, a conventional type wooden bowling pin 10, Figures 1 and 2, is cut away inwardly from the periphery of the pin adjacent its bottom 11 to form a cutaway bottom section 12 of the desired area for forming the base of impact resistant material. Formed in the periphery of the pin 10 at substantially the region of impact of a bowling ball therewith is an annular groove 13, the groove preferably tapering inwardly in cross section. Positioned along the longitudinal axis of the pin 10 is a bore 14, the bore extending from the bottom of the pin to the annularly grooved region of the pin 10. The annular groove 13 is interconnected with the longitudinal bore 14 by means of radial bores 15. Passageways 16 and 17 interconnect the cutaway section 12 with the longitudinal bore 10, the passageways extending from the cutaway section 12 upwardly and inwardly into the longitudinal bore 14. Thus, the first step in the process is forming the pin 10 with a cutaway bottom section, an annular groove extending about the periphery at substantially the region of impact of a bowling ball therewith, a bore positioned along the longitudinal axis and extending from the bottom of the pin to the annularly grooved region, a plurality of radial bores extending from the longitudinal bore and communicating with said groove, and passageways extending from the cutaway section to and into the longitudinal bore.

The pin 10 having its main body formed as herein above described is then placed in a two part forming mold 18, Figure 4, so designed as to form the desired base and band extending about the periphery of the pin at substantially the region of impact of a bowling ball therewith, both the base and band being fabricated of impact resistant material. The mold 18 is provided with an injection mechanism 19 for forcibly injecting a liquid into such mold, the mechanism including a cylindrical container 20 for the reception of liquid material therein, a detachable cover 21 therefor, a nozzle 22 projecting into the interior of the mold 18 and in communication with the container 20, and a piston 23 slidably

movable in the container 20 and supported in the cover 21. The liquid employed in the container 20 is a moldable plastic material settable upon heating, which material after setting and an integral part of a bowling pin has the inherent property of being impact resistant or resistant to the impact of a bowling ball with the bowling pin. The liquid moldable plastic material settable upon heating may be non-cured rubber which has been preheated to a temperature such as to render it molten or liquid, for example a temperature of 270 to 280 degrees Fahrenheit. With the container 20 charged with a mass of molten non-cured rubber the piston 23 is caused to be moved downwardly, thereby causing the molten rubber to flow through the longitudinal bore 14 into and out of the radial bores 15 into the annular groove 13, a portion of the molten rubber flowing through the passageways 16 and 17 into the space surrounding the cutaway section 12. When the longitudinal bore 14, radial bores 15, annular groove 13, passageways 16 and 17, and space surrounding the cutaway section 12 have been completely filled with the molten rubber, the piston 23 is placed under increased pressure by any suitable means and the temperature of the molten rubber increaesd to the vulcanizing or curing temperature. Under these conditions of temperature and pressure the rubber is allowed to set for a length of time depending upon the composition of the rubber. Preferably, the temperature is raised to a temperature of 290 to 300 degrees Fahrenheit and a pressure of 500 pounds per square inch. When the rubber has set, the temperature and pressure are reduced to normal temperature and pressure, whereupon the bowling pin 10 is removed from the forming mold 18. The resultant product is a completely formed bowling pin, Figure 5, having a base 25 and a band 26 extending about the periphery of the pin 10 at substantially the region of impact of a bowling ball therewith, both the base and band being fabricated of impact resistant material.

In place of employing non-cured rubber as the moldable plastic material settable upon heating, thermo setting resins like phenol formaldehyde, phenol furfural, urea formaldehyde, melamine formaldehyde, casein, may be used. Each of such resins would first have to be heated to a temperature to convert it to a molten state, and then the temperature would have to be increased to the setting temperature accompanied by the required application of pressure. For phenol formaldehyde and phenol furfural, the temperature should be increased to 270 to 400 degrees Fahrenheit with a pressure of from 2000 to 8000 pounds per square inch; for urea formaldehyde, the temperature should be increased to 290 to 325 degrees Fahrenheit with a pressure of from 1000 to 5000 pounds per square inch; for melamine formaldehyde, the temperature should be increased to 280 to 370 degrees Fahrenheit with a pressure of from 1000 to 8000 pounds per square inch; and for casein, the temperature should be increased to 200 to 225 degrees Fahrenheit with a pressure of from 2000 to 2500 pounds per square inch. Preferably, a reinforcing material such as cotton flock, shredded canvas, should be admixed with each of the aforementioned resins when employed for this purpose.

Other materials that may be employed as the moldable plastic material settable upon heating are thermoplastics such as cellulose acetate, cellulose butyrate, cellulose propionate, ethyl cellulose, polyvinyl chloride, vinyl chloride acetate, polyvinyl formal, polyvinyl butyral, polystyrene, styrene elastomer, polyethylene, polyamide. For each of the foregoing the following range of molding temperature and range of pressure are required.

Thermoplastic	Temperature	Pressure
	° F.	
Cellulose Acetate	340-500	3,000 to 30,000 lbs. per sq. inch.
Cellulose Butyrate	340-420	Do.
Cellulose Propionate	300-500	Do.
Ethyl Cellulose	350-500	Do.
Polyvinyl Chloride	300-400	10,000 to 30,000 lbs. per sq. inch.
Vinyl Chloride Acetate	250-340	18,000 to 30,000 lbs. per sq. inch.
Polyvinyl Formal	350-400	10,000 to 30,000 lbs. per sq. inch.
Polyvinyl Butyral	250-340	15,000 to 30,000 lbs. per sq. inch.
Polystyrene	375-500	10,000 to 30,000 lbs. per sq. inch.
Styrene Elastomer	355-410	15,000 to 20,000 lbs. per sq. inch.
Polyethylene	325-375	4,500 to 20,000 lbs. per sq. inch.
Polyamide	510-600	5,000 to 50,000 lbs. per sq. inch.

What is claimed is:

1. In a process of making a wooden bowling pin having a base and a band extending about the periphery of the pin at substantially the region of impact of a bowling ball therewith, the band being fabricated of impact resistant material, the steps comprising forming said pin with an annular groove extending about the periphery at substantially the region of impact of a bowling ball therewith, a cutaway bottom section extending longitudinally inwardly from the periphery of said pin adjacent to and terminating in the bottom of said pin, and a bore extending from the bottom of the pin and communicating with said groove and said section, filling said groove, the space surrounding said cutaway section and bore with a molten moldable plastic material settable upon heating, and subjecting said plastic material to an elevated temperature and pressure to form a band of impact resistant material attached to said pin.

2. In a process of making a wooden bowling pin having a base and a band extending about the periphery of the pin at substantially the region of impact of a bowling ball therewith, both the base and band being fabricated of impact resistant material, the steps of forming said pin with a cutaway bottom section extending longitudinally inwardly from the periphery of said pin adjacent to and terminating in the bottom of said pin, an annular groove extending about the periphery at substantially the region of impact of a bowling ball therewith, a bore positioned along the longitudinal axis and extending from the bottom of the pin to the annularly grooved region, a plurality of radial bores extending from the longitudinal bore and communicating with said groove, and passageways extending from the cutaway section to and into the longitudinal bore, filling the groove, bores, passageways, and space surrounding said cutaway section with a molten moldable plastic material settable upon heating, and subjecting said plastic material to

an elevated temperature and pressure to form a base and band of impact resistant material attached to said pin.

3. In a process of making a wooden bowling pin having a base and a band extending about the periphery of the pin at substantially the region of impact of a bowling ball therewith, both the base and band being fabricated of impact resistant material, the steps of forming said pin with a cutaway bottom section extending longitudinally inwardly from the periphery of said pin adjacent to and terminating in the bottom of said pin, an annular groove tapering inwardly in cross section and extending about the periphery at substantially the region of impact of a bowling ball therewith, a bore positioned along the longitudinal axis and extending from the bottom of the pin to the annularly grooved region, a plurality of radial bores extending from the longitudinal bore and communicating with said groove, and passageways extending upwardly and inwardly from the cutaway section to and into the longitudinal bore, filling the groove, bores, passageways, and space surrounding said cutaway section with a molten moldable plastic material settable upon heating, and subjecting said plastic material to an elevated temperature and pressure to form a base and a band of impact resistant material attached to said pin.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,770,388	Bishop	July 15, 1930
2,086,939	Hess	July 13, 1937
2,120,553	Flader	June 14, 1938
2,180,676	Guimond	Nov. 21, 1939
2,289,872	Brinkmann	July 14, 1942