Jan. 3, 1956 W. B. CLAPHAM 2,729,450

CONTROLLED MOISTURE CONTENT BOWLING PINS

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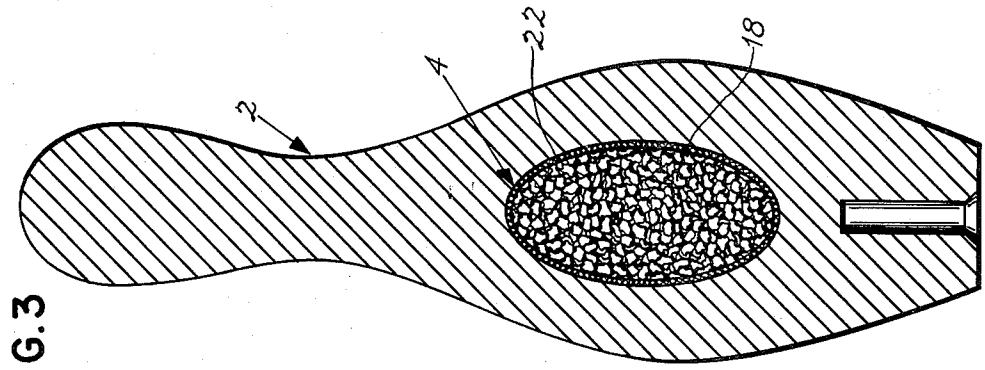


FIG. 3

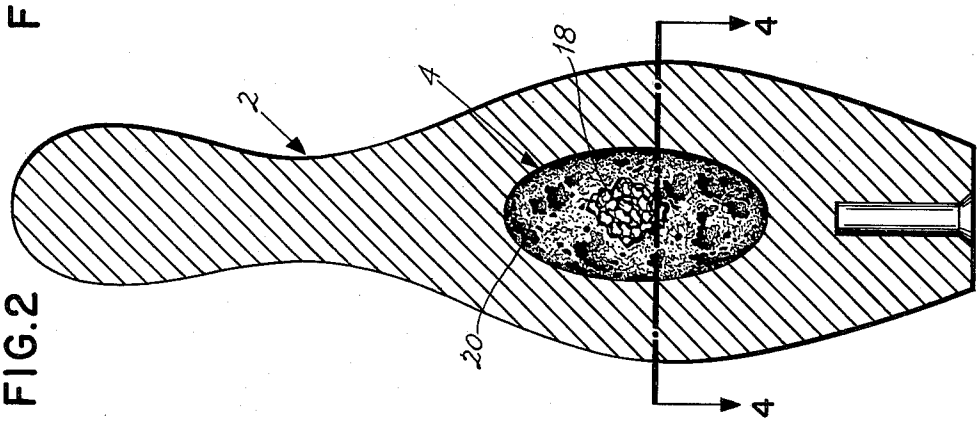


FIG. 2

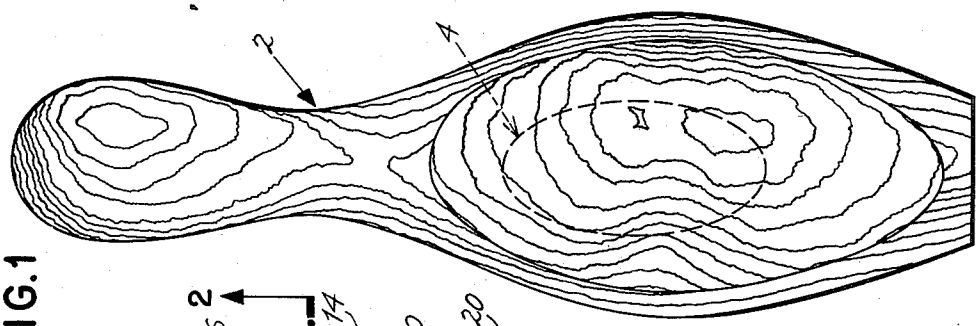


FIG. 1

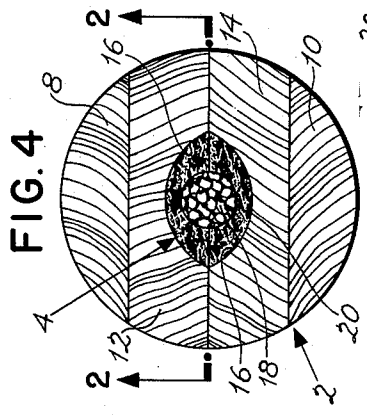


FIG. 4

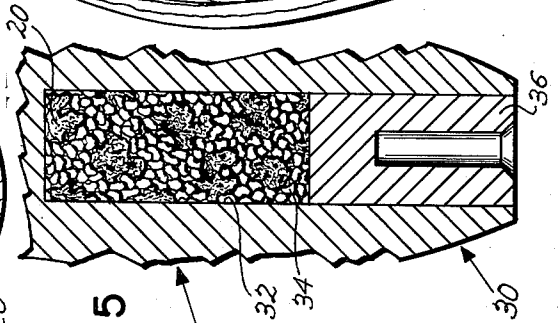


FIG. 5

INVENTOR

Wentworth B. Clapham

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CONTROLLED MOISTURE CONTENT BOWLING PINS

Wentworth B. Clapham, Chappaqua, N. Y., assignor to American Machine & Foundry Company, a corporation of New Jersey

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This invention relates to bowling pins, and more particularly to bowling pins having means for controlling their moisture content and increasing and prolonging their useful life.

The present invention relates to an improvement in bowling pins wherein pins made in accordance with the invention are tougher, and more resistant to checking, or cracking because of the fact that pins are provided with means for controlling or preventing the escape of moisture from the wood of the pin. Pins made in accordance with the invention tend to retain a substantially constant moisture content, and in certain cases to actually absorb additional moisture. They are more resistant to checking, and splintering, especially in zones such as the belly and the neck portion where, because of impact of balls and one pin striking against the other, there is usually considerable damage and frequently breakage of the neck end of a pin.

It is well known that when a substantial crack occurs in the neck of a pin, the sound is different when it is hit by a ball, and such pins soon break and must be thrown away. Usually when pins are new, their outer surfaces are smooth and free from dents, cracks or checks. However, as a pin ages, as considerable shrinkage occurs it usually loses its moisture, especially in the neck zone. It is known that as the moisture content of wood varies, dimensional changes occur. In hard woods, such as maple from which most pins are made, this change in moisture content with the consequent dimensional changes may cause splitting and serious damage in a pin. It is believed also this is due to the migration of residual moisture upwardly through the pin to the neck portion which is the smallest section of the pin, where it evaporates in the form of water vapor. This loss of moisture, as stated above, is believed to be one of the prime causes of neck checks which result in the weakening of the neck portion and possible future breakage as the pin is used in normal play.

The present invention consists of a solution to the above noted problems because it takes into consideration the desirability of controlling moisture so that the moisture is maintained within a narrow range even after the pin has been put in use, and nicks and breaks are formed in the paint or plastic covering thereof.

The desired control of moisture in bowling pins made in accordance with the invention is achieved by the use of certain hydrated salts which absorb and give off moisture, depending upon the humidity of the surrounding air. These hydrated salts all have a certain equilibrium vapor pressure; that is, if they are placed in a sealed chamber, or for example in a cavity formed internally in a bowling pin, and allowed to stand, the vapor pressure or humidity of the surrounding atmosphere will have a definite value, depending somewhat on the temperature. Therefore, as the humidity of the surrounding atmosphere varies, the hydrated salts will act to change the humidity to the equilibrium value by either giving off or absorbing water vapor as required by humidity conditions.

In accordance with the invention, pins are provided with a substantially central cavity or chamber which is so located within the pin that the center of gravity thereof is not substantially affected or changed. There is placed in the cavity or chamber a substance or material, or a mixture of both, which forms a part of the pin and is capable of maintaining the moisture substantially constant, or materials and substances or combinations thereof which actually absorb moisture through the pores of a pin from the outside atmosphere and concentrate it in the pin while at the same time if the absorbing agents become super-saturated, they actually give off moisture until a state of substantial equilibrium moisture-wise exists in each pin. Thus bowling pins constructed in accordance with the invention are substantially free from drying out completely and do not become brittle, which would result in excess cracking, splintering and ultimate breakage, rendering them unfit for use. Pins embodying the invention are tougher, more durable and have a markedly increased life span.

It is an object of the invention to provide a novel bowling pin which, because of its moisture control construction is tougher and more resistant to wear and tear and therefore has a longer, useful life.

It is a further object of the invention to form a bowling pin having a substantially central cavity or chamber in which is placed a moisture control agent having the capacity of maintaining the moisture content of the pin substantially constant thereby preventing the drying out of a bowling pin.

Under some conditions of use, as where bowling alleys are located in climates which are very moist, it may be desirable to use a moisture control agent which absorbs moisture from the wood and tends to maintain a state of moisture equilibrium in the wood thereof. In this way, any water vapor coming in contact with the surface of a pin, and especially in zones where cracks occur in the paint covering, will tend to be absorbed by the pores of the wood that are exposed by nicks and checks and ultimately will move toward the center of the pin where the moisture control agent in the cavity will absorb and hold it. In other climates such where the quantity of moisture vapor varies between extremes, the moisture control agent will be one which can absorb a maximum quantity of moisture and then release it. In this way, the moisture control agent prevents substantial changes in the moisture content of the wood and thus guards against drying out, thus preventing shrinking, checking and cracking and making the pin tougher generally to ward off destruction from the impact of balls and one pin striking against the other.

With these and other objects not specifically mentioned in view, the invention consists in certain combinations and constructions which will be described fully hereinafter, and then set forth in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same or like parts:

Fig. 1 is a view of a bowling pin made in accordance with the invention;

Fig. 2 is a view taken on line 2—2 of Fig. 4;

Fig. 3 is a longitudinal sectional view of a modified form of a bowling pin made in accordance with the invention;

Fig. 4 is a view taken on line 4—4 of Fig. 2;

Fig. 5 is a partial sectional view of a second modified form of the invention.

In the drawings which illustrate the invention, and in particular Figs. 1, 2 and 4, which show a preferred form thereof, 2 indicates a bowling pin having a cavity or chamber, 4 located substantially centrally therein and along the longitudinal axis of a pin and preferably at the

center of gravity thereof. This is desirable because it insures that the stability of the pin at all times will remain unchanged even though chamber 4 is filled with the desired moisture control agent.

In the embodiment of the invention shown in Figs. 1–4 inclusive, chamber 4 is formed in a laminated pin. As indicated in Figs. 1 and 4, there are provided several laminations of wood which are used in forming the complete pin structure. When each pin is made, the desired pieces of wood 8, 10, 12 and 14 for laminating are selected, and arranged in proper association. In Fig. 4 the pieces which are to form the center portion of the pin, namely, sections 12 and 14 (Fig. 4), there is cut out by means of a suitable tool, such as a routing tool, a depression 16, which forms one-half of the center chamber. Depressions 16 may be of any suitable size or shape depending upon the quantity of wood to be removed in order to control the weight of a given number of pins, based on the weight of the several pieces of wood which are used in making the pin assembly. Then the several pieces are assembled and secured adhesively together by a suitable adhesive, such as a room temperature setting resin adhesive or a thermo setting adhesive, such as phenol formaldehyde, urea formaldehyde or a similar well known synthetic resin or adhesive of this same type. The resulting block of laminated wood is then turned down to final pin size.

Before the association of pieces 12 and 14 together in final assembly, the moisture control material is placed in one or both depressions 16 in a quantity sufficient to fill the resulting chamber 4 in order to provide the moisture control means of the invention. Thus when the pieces 12 and 14 are secured together by adhesive, the moisure control material is enclosed and permanently located in chamber 4 and forms an integral part of the final pin.

Suitable hydrates which can be used as moisture control means or agents are listed as follows:

Table 1

$CuSO_4.H_2O$
$CuSO_4.5H_2O$
$Na_2CO_3.H_2O$
$Na_2B_4O.5H_2O$ and $Na_2B_4O_7.10H_2O$
$Na_2SO_4.10H_2O$, $Na_2SO_4.7H_2O$
$MgSO_4.7H_2O$
$MgSO_4.H_2O$
$Na_2HPO_4.12H_2O$, $Na_2HPO_4.7H_2O$, $Na_2HPO.2H_2O$
$Na_3PO_4.12H_2O$, $Na_3PO_4.10H_2O$

The invention also contemplates the use of saturated salt solutions admixed with solid salts as a humidity or moisture control device. For the purposes of the invention, the saturated solution can be absorbed on some carrier, such as sponge, natural or synthetic, or cork or asbestos, and solid salts mixed with the impregnated carrier. Suitable systems together with the equilibrium humidities are listed as follows:

Table 2

Solid phase:	Per cent humidity
$KC_2H_3O_2$	20
$K_2CO_3.2H_2O$	43
$Ca(NO_3)_2.4H_2O$	51
NH_4Cl and KNO_3	68.6
$NaClO_3$	75

The invention also contemplates the use of glycerol, diethylene glycol and sorbitol on a suitable carrier such as sponge either natural or synthetic, cork or asbestos or other similar materials. These solutions will serve a purpose similar to the solutions noted above, since they act as water vapor controlling agents.

Fig. 1 illustrates a preferred form of the invention in which the moisture control agent is contained within a chamber designated generally 4. Figs. 2 and 3 indicate diagrammatically longitudinal sectional views of a bowling pin of the type shown in Fig. 1 made in accordance with the invention showing the chamber 4, and alternative ways of enclosing a desired moisture control agent. Although a single chamber 4 is shown, if desired an additional chamber may also be provided. Chamber 4 is located preferably at the center of gravity of the pin so that its stability is unchanged, even in the case where moisture is absorbed and held by the moisture control medium contained therein.

Instead of the combination of fibrous material and hydrate moisture control agent shown in Fig. 2, the chamber 4 can be filled with a saturated salt solution admixed with solid salts such as indicated in Table 2 above. Also the moisture control agent 18 indicated in Figs. 2, 4 and 5 can be replaced by a solution of glycerol, diethylene glycol and sorbitol or other suitable humectant applied to the carrier or fibrous material such as sponge or other suitable fibrous materials, such as mentioned hereinabove.

Fig. 5 shows the invention as applied to a solid pin designated generally 30. This pin is provided with an axial bore 32 made by a suitable wood working tool in which is located the moisture control material or agent 34. The latter may consist of a mixture of hydrate and carrier, as described above in connection with Fig. 2. The moisture control material may also consist solely of a suitable hydrate such as indicated in Table 2 or it may be enclosed in a sack 22 such as illustrated in Fig. 3, and filling a part of axial bore 32. The selected moisture control agent is located preferably in the zone of the center of gravity of pin 30, for the same reasons as stated above in the case of pin 2 shown in Figs. 1–4 inclusive. The moisture control agent in bore 32 may also consist of a saturated salt solution admixed with solid salts of the type indicated in Table 2, or a solution of glycerol, diethylene glycol or sorbitol applied to a fibrous carrier such as sponge or cork, as indicated above.

The moisture control agent 20 or the moisture control material 20, 34 is retained in bore 32 by a plug 36 secured by any suitable adhesive in bore 32.

Bowling pins of the types shown in the drawing may be called "controlled-weight" pins. This is because in their manufacture the weights of any quantity of pins are closely controlled in accordance with prescribed specifications. In making a quantity of pins of this type a decided weight is determined in advance. From the wood used in making each pin wood is removed such that each resulting pin meets the weight specification for a given lot. In pins of the type shown in Figs. 1 to 4 inclusive wood is removed from laminates 12 and 14 to form the depressions 16 which are filled with the desired moisture control medium. In pin 30 shown in Fig. 5 the desired amount of wood is removed in forming bore 32. Plug 36 will vary in length depending upon the selected weight of the final pin. It will be seen therefore that by the use of proper quantities, and proper mixtures of selected moisture control means, and carriers which fill chamber 4 and bore 32 respectively, as described above, it is possible in accordance with the invention to produce a novel "controlled-weight" bowling pin, which is more rugged, more resistant to wear and tear in the course of play, and therefore has a longer life, because of the moisture control medium forming a part thereof.

While I have shown the preferred embodiment of the invention, it is to be understood that the invention may be varied in construction within the scope of the claims, for the particular embodiments, selected to illustrate the invention, are but a few of the possible concrete embodiments of the same. The invention therefore is not to be restricted to the precise details of the structure shown and described.

What I claim is:

1. A bowling pin provided with an interior chamber, and a moisture controlling medium enclosed in said chamber, said moisture controlling medium being operative to

prevent substantial moisture changes in the wood of said pin, and thereby maintain the moisture content of said pin substantially constant.

2. A bowling pin provided with an interior chamber, located substantially at the center of gravity of said pin, and a moisture controlling medium enclosed in said chamber, said moisture controlling medium being operative to prevent substantial moisture changes in the wood of said pin, and thereby maintain the moisture content of said pin substantially constant.

3. A bowling pin provided with an interior chamber located substantially at the center of gravity of said pin, and a moisture controlling medium in said chamber adapted to maintain the moisture content of said pin substantially constant.

4. A bowling pin provided with a chamber located substantially centrally thereof, and a moisture retaining and controlling material filling said chamber and forming a substantially permanent part of said pin.

5. The invention defined in claim 1, wherein said moisture controlling medium comprises a hydrated inorganic salt.

6. A bowling pin provided with a chamber located substantially at the center of gravity of said pin, and a moisture retaining and controlling agent located in said chamber, and forming a part of said pin, said agent comprising a carrier and a hydrated salt admixed therewith.

7. The invention defined in claim 6 wherein said carrier comprises a fibrous material, such as sponge.

8. The invention defined in claim 6 wherein said carrier consists of pieces of cork.

9. A wooden bowling pin provided with an interior chamber formed therein, and substantially coaxial therewith, a moisture retaining and controlling material filling said chamber, and a wrapper enclosing said material, said material being operative to maintain the moisture content of the wood of said pin substantially constant.

10. A bowling pin provided with an interior chamber located substantially centrally of said pin, and a moisture controlling medium comprising a solid material which exhibits a reversible equilibrium point with respect to water vapor pressure enclosed in and substantially filling said chamber, said medium being adapted to maintain the moisture content of said pin substantially constant.

11. The invention defined in claim 10 wherein said moisture controlling medium is a hydrated inorganic salt.

12. A bowling pin provided with an interior chamber located substantially centrally and on the longitudinal axis of said pin, and a moisture controlling medium of the type having a combination of solids in contact with a saturated solution filling said chamber, and adapted to maintain the moisture content of said pin substantially constant.

13. A bowling pin provided with an interior chamber located substantially centrally and on the longitudinal axis of said pin, and a moisture controlling medium of the type having a combination of solids in contact with a saturated solution and an absorbent carrier admixed therewith filling said chamber, and adapted to maintain the moisture content of said pin substantially constant.

14. A bowling pin provided with an internal chamber and a moisture controlling agent comprising a humectant absorbed on a carrier filling said chamber and adapted to maintain the moisture content of the wood of said pin substantially constant.

15. The invention defined in claim 1 wherein said moisture controlling medium comprises copper sulphate.

16. The invention defined in claim 1 wherein said moisture controlling medium comprises a hydrated sodium salt.

17. The invention defined in claim 1 wherein said moisture controlling medium comprises a hydrated magnesium salt.

18. The invention defined in claim 1 wherein said moisture controlling medium is a hydrated alkaline metal salt.

19. The invention defined in claim 12 wherein said moisture controlling medium is a saturated salt solution admixed with solid alkaline metal salts, and an absorbent carrier.

20. A bowling pin provided with a chamber located substantially centrally thereof and in the zone of the center of gravity of said pin, and a moisture controlling material filling said chamber and forming a substantially permanent part thereof, and a porous wrapper enclosing said material, and maintaining said material in said chamber in substantially immovable relationship, said material being adapted to maintain the moisture content of said pin substantially constant.

21. A wooden bowling pin provided with an interior chamber formed therein and a moisture retaining and controlling material comprising a humectant on a carrier filling said chamber, and adapted to maintain the moisture content of said pin substantially constant.

22. The invention defined in claim 12 wherein at least one of said solids is an alkaline metal salt.

23. The method of forming a wooden bowling pin comprising providing a cavity in the interior of said pin, and filling said cavity with a moisture controlling substance adapted to maintain the moisture of said pin substantially constant.

24. The method of forming a wooden bowling pin comprising forming depressions in selected members which are to be laminated to form said pin, filling said depressions with a moisture controlling medium, bringing said selected members with said filled depressions into complementary relationships with each other and adhesively securing all of said selected members together to form a laminated wooden block, and then turning said block to pin form, whereby the resulting pin is provided with a substantially centrally located moisture controlling medium adapted to maintain the moisture of said wood of said pin substantially constant.

25. The method of forming a bowling pin comprising forming an enlarged axial bore extending upwardly from the base of said pin into the zone of the center of gravity of said pin, filling at least a portion of said bore with a moisture controlling medium, and then securing said medium in said bore of said pin as a permanent part thereof.

26. A bowling pin provided with an axial bore extending centrally upwardly within said pin from the base thereof and forming a material receiving and supporting chamber, a moisture control material enclosed in said chamber, and a plug located in the lower portion of said bore and having an end substantially co-extensive with the base of said pin securing said material in said cavity.

27. A wooden bowling pin of the type described, said pin being provided with an enlarged axial bore forming a chamber extending substantially centrally of said pin, and upwardly from the base thereof, a moisture controlling agent located in said bore, said agent being adapted to prevent substantial changes in the moisture content of the wood forming said pin, and means permanently securing said moisture control agent in said bore of said chamber.

28. The invention defined in claim 27 wherein said moisture control agent is a hydrated salt of the type which absorbs and gives off moisture, whereby to maintain the moisture content of said pin substantially constant.

29. The invention defined in claim 27 wherein said moisture control agent is a substance of the type having a solid salt in contact with a carrier impregnated with a saturated salt solution.

30. The invention defined in claim 27 wherein said moisture control agent is a carrier impregnated with a humectant operative as a water vapor controlling means in maintaining the moisture content of said pin substantially constant.

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