BOWLING LANE CONDITIONER FOR IMPROVED AND LASTING BALL CONTROL

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3 Claims

ABSTRACT OF THE DISCLOSURE

A bowling lane conditioner is disclosed which comprises mineral oil, from about 0.2 to 5% by weight of a surfactant such as polyoxyalkylene alkyl ether, and from about 2.0 to about 24% by weight of a coupling agent such as isooctyl stearate. The conditioner is dissolved in a solvent system which advantageously includes a lower alkyl monohydric alcohol.

This invention relates to a new and improved bowling lane conditioner for use on bowling lanes which have been coated with nitrocellulose lacquers or similar type coatings. More particularly, the invention relates to a bowling lane conditioner which is applied to nitrocellulose lacquers on bowling lanes and which provides unusually long-lasting and consistent slip qualities to the surface of the bowling lane. The improved slip qualities contribute to better control of the bowling ball as it rolls over the bowling surface in the process of bowling.

Bowling lanes, as is well known, are commonly fabricated of wood blocks, wherein a plane surface is provided with a durable serviceable finish. Bowling lanes are commonly finished with wood finishing nitrocellulose lacquers, which may include plasticizers for the nitrocellulose and small amounts of polyglycerol siloxane which function as flow control agents and temporary slip-producing agents. The purpose of these lacquers is to provide finished coatings having high abrasion resistance, and good resistance to dirt-pick-up and scuffing.

In order to decrease the coefficient of friction between the lacquers used to finish the bowling lane and the bowling ball, and in order to provide a bowling surface with the correct slippage or coefficient of friction, the nitrocellulose lacquer finish is periodically dressed or conditioned with a bowling lane conditioner. At most bowling lanes, the daily maintenance includes the application of a dressing or conditioner to the bowling lane. The conditioner, in accordance with the prior art, is composed chiefly of oil, and is applied directly over the lacquer-coated bowling lane surface. The conditioner acts as a protective medium for the lacquer and helps to reduce the tendency of the surface to wear as well as reducing its tendency to pick up dirt from contact with the bowling ball. The conditioner, because of its lubricating qualities, also provides slip to the lacquer surface. The slip-producing quality reduces the friction between the bowling ball and the coated lane surface so that the action of the ball (amount of hook) can be controlled by the bowler.

It has been determined that in the process of bowling, the conditioners on the bowling lane gradually lose their lubricating qualities. This is due to the fact that oil is displaced or picked up by the bowling balls. As the lubricating effects of the conditioner are reduced, the hooking tendency (lateral movement) of the thrown bowling ball increases. This change in the lubricating qualities of the conditioner causes a change in the coefficient of friction between the bowling lane and the bowling ball. As this change occurs, undesirable results follow, since a similarly thrown bowling ball will hook to a greater extent as the coefficient of friction increases. Thus the bowler is unable to control his ball and is unable to score well.

The present invention provides a new bowling lane conditioner or dressing which comprises a lubricating medium having a high affinity for the bowling lane finish. This new bowling lane conditioner reduces the undesirable displacement or pick-up of the conditioner by the bowling ball which characterizes prior art bowling lane conditioners. Thus the present invention provides for a bowling lane conditioner which maintains the lubricating effect of the conditioner for a longer period of time, and as a result the ball control on a bowling lane treated with the conditioner of this invention is stabilized over an extended period of time which contributes to better scoring.

The present invention is based on the discovery that the addition of a minor amount of surfactant and a minor amount of a coupling agent therefor to mineral oil improves the lubricating properties of the mineral oil as a bowling lane conditioner and extends the effective life of the mineral oil as a bowling lane conditioner. The addition of the surfactant and the coupling agent to the mineral oil necessitates an adjustment to the solvent system needed for the bowling lane conditioner which can be accomplished by adding a cosolvent to the usual solvents for mineral oil.

The surfactants contemplated by this invention include those materials having a higher HLB value (non-ionic hydrosoluble) which are or can be made compatible with mineral oil. Generally this invention contemplates the use of ethers formed from polyoxyalkylene alcohols, based on from 2 to 20 polyoxyalkylene groups and condensed with long chain fatty alcohols having between about 10 and 25 carbon atoms as the surfactant. It has been found that among these various ether compounds, good results are obtained with the polyoxethylenoxy ethyl ethers which contain between about 2 and 20 polyoxyethylenoxy groups per molecule. The best results have been achieved through the use of highly refined polyoxethylenoxy (10) oleyloxyether. When used in accordance with this invention, this class of surfactants shows a high affinity for the nitrocellulose lacquers and have provided long-wearing bowling lane conditioners.

It has been found that most of the surfactants of the class required by this invention are not compatible with mineral oil and that one or more coupling agents are necessary to keep the surfactant homogeneously dispersed or distributed throughout the mineral oil.

It has been found that the best coupling agents are selected from relatively high molecular weight esters. For instance, such materials as isopropylyl myristate, and butyl oleate have given good results, while fair results have been achieved with dioctyl adipate. The best results have been achieved with isooctyl stearate, which provides superior qualities of compatibility as well as excellent aid lasting slip characteristics. It is the chief function of the coupling agent to maintain the surfactant and mineral oil in a homogeneous dispersion or solution in order that there is no separation of the surfactant from the mineral oil under the conditions of application or bowling play.

It has been further found that some of the materials which function as coupling agents also improve the slip or lubricating qualities of the conditioners and thus tend to increase the durability, since the coupling agent does not volatilize after application to the conditioner, but is deposited with the mineral oil as part of the conditioner.

In compounding the conditioner or dressing of this invention, it is highly important to use a solvent system which will completely dissolve all the materials. The requirement of complete solubility of the conditioner is essential if the coating is to be applied uniformly and

The mineral oil used in connection with this conditioner should comprise a major proportion (70 percent or more) of the non-volatile materials, e.g. the conditioner after the solvents have been evaporated. The mineral oils which are most desirable for use in this invention, are classified as “white mineral oils.” These oils are odorless, tasteless, and colorless petroleum or mineral based oils. Since petroleum oils are complex mixtures containing many different hydrocarbons, it is difficult to chemically describe the petroleum oils. The mineral oils most useful for use in this invention are those which have been refined to remove unsaturated aliphatic and aromatic hydrocarbons, and have been finally filtered to obtain a water-white color. While it is possible to use non-water white oils, and under some circumstances their performance as bowling lane conditioners may be adequate, they are generally not preferred since they tend to impart undesirable colors to the bowling alley.

The total amount of solvents should comprise roughly 50 percent by weight of the net composition with the amount of cosolvent being controlled by the amount of surfactant and stabilizer present in the composition. As mentioned above, it is necessary to use sufficient solvent to dissolve or disperse all of the materials completely. Beyond that, the amount of solvent should be adequate to permit easy applications to the bowling lane surface. Higher amounts of solvents than about 50 percent, are not necessary since they tend to increase the expense of the conditioner material (determined on a non-volatile basis) without improving the effectiveness.

The following examples will serve to illustrate the preparation of the bowling lane conditioners of this invention, but it is understood that the examples are set forth merely for illustrative purposes and many other bowling lane conditioners are within the scope of the present invention:

**EXAMPLE 1**

A bowling lane conditioner of the following formulation was made up:

<table>
<thead>
<tr>
<th>Parts by weight</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyoxyethylene (10) oley ether</td>
<td>10.5</td>
</tr>
<tr>
<td>Isocetyl stearate</td>
<td>3.0</td>
</tr>
<tr>
<td>White mineral oil</td>
<td>46.5</td>
</tr>
<tr>
<td>Odorless mineral spirits</td>
<td>42.0</td>
</tr>
<tr>
<td>n-Butyl alcohol</td>
<td>8.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The above-described conditioner was applied to bowling lanes in the normal manner. A professional bowler was retained to test the bowling lanes treated with the conditioner of this invention by bowling alternatively on a lane treated with the conditioner of this invention and a lane treated with the standard conditioner, comprising 50 percent mineral oil and 50 percent mineral spirits. It was the opinion of the professional that the conditioner of the present invention represented a substantial improvement over the prior art conditioner. He felt that the lane treated with the conditioner of this invention gave consistent reproducible ball control over a long period of play, while the balls thrown on the other lane hooked to a different degree as play progressed.

The slip and durability characteristics of the bowling conditioner of Example 1 were evaluated using an automatic slip-testing device. This slip-testing device tests bowling lane conditioners by allowing a bowling ball to

| homogeneously to the bowling lane. Many different solvents may be successfully used. It has been found that various petroleum fractions which are fairly volatile are parts of surfactant such as the mineral spirits, ligroin, or petroleum spirits. While mineral spirits have given best results, this invention also contemplates the use of other aliphatic hydrocarbons (naphthas) as well as the common aromatic hydrocarbons, such as xyol or toluol, for use as the main solvent in connection with this invention. As is apparent, a portion of the surfactants in the mineral oil along with the coupling agents therefore, necessitates an adjustment to the usual solvents. Mineral spirits, which is the best main solvent, will not completely dissolve the combination of mineral oil and the surfactants, and coupling agents required by this invention. It has been found that the best results can be obtained through the use of one or more cosolvents, such as the lower aliphatic monohydric alcohols. Extremely effective results have been achieved through the use of n-butyl alcohol. Secondary butyl alcohol is equally as effective as n-butyl alcohol, but the flash point is lower, and therefore the secondary butyl alcohol is less desirable. Other materials which may be used as the cosolvent include isobutanol, isopropyl alcohol and the like. This invention generally contemplates the use of lower alkyl monohydric alcohols having from 3 to 6 carbon atoms in the alkyl group. Mentioned above, some of these solvents are less desirable due to their relatively low flash point, but their solvent properties thereof are completely adequate for use as a cosolvent within the scope of this invention. The basic requirement for the cosolvent is that it function with the major solvent to dissolve all of the materials which function as a bowling lane conditioner, e.g. the surfactant, the coupling agent and the mineral oil. It has been found that an effective amount of the surfactant should be used with the mineral oil to make up the conditioner of this invention. The exact amount used will vary in accordance with the precise type of surfactant used, but it has been found that using polyoxyethylene (10) oley ether, the surfactant may vary between about 0.1 percent by weight and about 2.5 percent by weight, based on the weight of the complete conditioner including solvent. Thus the surfactant may be present in about 0.2 percent to about 5.0 percent based on the weight of the mineral oil. It has been found that the best results are obtained with polyoxyethylene (10) oley ether when it is present in the range of between about 1.0 percent and about 3.0 percent based on the weight of the mineral oil. Concentrations of more than about 3.0 percent tend to increase the coefficient of friction somewhat, although the lasting qualities or durability of the conditioner is not necessarily impaired. Also, an excess of the surfactant tends to aggravate the problem of incompatibility. While the lower value of 0.2 percent surfactant produces some of the advantages discussed above, the effectiveness of the surfactant decreases as the amount of surfactant is reduced below about 1.0 percent based on the weight of the mineral oil.

The amount of coupling agents required for use in this invention will vary somewhat in accordance with the amount of surfactant used, the type of surfactant used, and the type of coupling agent used. In any event, sufficient coupling agent must be used to form a homogeneous solution or dispersion of the surfactant and the mineral oil under the conditions of the bowling lane conditioner. Generally speaking, from about 1 percent to about 12 percent of the coupling agent, based on the weight of the complete conditioner including solvent, should be used or from about 2 percent up to 24 percent based on the weight of the mineral oil may be used. Best results have been obtained using at least 3 percent of the coupling agent when the range of surfactant is between about 1 percent and 3 percent. Functionally, there is no real upper limit, since the coupling agent may be as high as 24 percent or more, but the real limitation is a matter of economics.
slide over a bowling lane finish treated with the conditioner being tested. It was found that the lubricating qualities of the material described in Example I were excellent, and more importantly, its lasting qualities were superior to the other conditioners tested. The automatic slip-testing device also showed that the product of Example I had a great affinity for nitrocellulose lacquers. The automatic slip-testing device further showed that the bowling ball had a lesser tendency to pick up oils from the product of Example I.

EXAMPLE II

The bowling lane conditioner of the following formulation was made up:

<table>
<thead>
<tr>
<th>Parts by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyoxyethylene (10) oleyl ether</td>
</tr>
<tr>
<td>Dioctyl adipate</td>
</tr>
<tr>
<td>Mineral oil</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

This conditioner was mixed with 84 parts of odorless mineral spirits and 16 parts of n-butyl alcohol to give 200 parts of conditioner. The product of Example II was tested in the automatic slip-testing device, where it was determined that it had good and lasting slip qualities.

EXAMPLE III

Another bowling lane conditioner was made up from the following formulation:

<table>
<thead>
<tr>
<th>Parts by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyoxyethylene (10) oleyl ether</td>
</tr>
<tr>
<td>Butyl oleate</td>
</tr>
<tr>
<td>Mineral oil</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

This material was dissolved in 84 parts by weight of odorless mineral spirits and 16 parts by weight of n-butyl alcohol. The resulting product was tested in the automatic slip-testing device. This test showed that the product of Example III provided acceptable slip and lasting qualities. While the slip and lasting qualities were not as good as the qualities achieved by the products of either Example I and Example II, it represents a distinct improvement over the use of straight mineral oil dissolved in mineral spirits.

The bowling lane conditioners of this invention may be applied to bowling lanes in a normal manner. Generally speaking they may be applied by manual spray or automatic equipment in amounts sufficient only to wet the surface of the bowling lane.

The forms of invention herein shown and described are to be considered as only illustrative. It will be apparent to those skilled in the art that numerous modifications may be made therein without departure from the scope and spirit of the invention or the scope of the appended claims.

I claim:

1. A bowling lane conditioner, which is substantially free of water, comprising 100 parts by weight of mineral oil; from about 0.2 to about 5.0 parts by weight of a polyoxyethylene oleyl ether containing about 10 oxyethylene units; from about 2 to about 24 parts by weight of a coupling agent selected from the group isopropl myristate, butyl oleate, dioctyl adipate, and isocetyl stearate; and from about 80 to about 120 parts by weight of a solvent system comprising a lower aliphatic monohydric alcohol cosolvent and a main solvent selected from the group consisting of mineral spirits, ligroin, petroleum spirits, naphtha, xylool and toluol.

2. A bowling lane conditioner as described in claim 1, wherein the coupling agent is isocetyl stearate.

3. A bowling lane conditioner as described in claim 1, wherein said solvent system consists essentially of a major amount of mineral spirits, and a minor amount of a lower alkyl monohydric alcohol having from about 3 to about 6 carbon atoms in the alkyl group.

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