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COATING COMPOSITION

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This invention relates to a means for preventing dirt collection and discoloration from that source in cellulose derivative finishes and more particularly to an improved bowling pin carrying a coating of a cellulose derivative finish which is highly resistant to dirt collection.

Commercial practice for finishing bowling pins provides for the application of two or more coats of a cellulose nitrate composition by conventional spraying or dipping operations. The cellulose nitrate coating composition may consist of cellulose nitrate plasticized or softened with a minor proportion of castor oil. The inclusion of a resin except in very minor proportions is generally avoided because of a greater tendency of compositions containing such materials to increase dirt pick-up. The use of appreciable amount of plasticizer or softener is not acceptable for the same reason. Bowling pins through the severe impacts encountered from several sources in their customary use and the friction occasioned by the rolling and spinning of the pin on the alley surface and in the pit at the end of the alley become badly discolored, particularly at the area of maximum circumference, by embedded dirt picked up through the aforementioned causes. Visibility is thus greatly reduced and the pins are then discarded or must be cleaned or refinished after short usage.

The present invention, therefore, offers a marked advance in this direction in practically eliminating the defect of dirt collection during the normal life of a bowling pin.

A primary object of the invention is the provision of a means for preventing dirt pick-up of articles coated with a cellulose derivative finish, particularly such articles as may be exposed to impact and/or frictional forces when dirt and grit may likewise be present. Another object is the provision of a cellulose derivative coating composition which provides a tough, adherent film resistant to the pick-up of dirt and the retention thereof in the finish surface to cause unsightly discoloration. A further object is the provision of an improved bowling pin which does not become discolored by dirt collection, thereby maintaining good visibility and greatly extending the useful life of the pin. Other objects will appear as the description of the invention proceeds.

These objects are accomplished by the incorporation in a substantially resin-free cellulose derivative coating composition of an agent which functions to directly resist dirt collection and the subsequent retention thereof in the surface of the finish of articles coated with the improved com-

position when such articles are subjected to impact and/or frictional forces in the presence of dirt particles.

The following examples are given by way of illustration only and no limitations are intended thereby except as indicated in the appended claims.

Example 1

	Per cent by weight
10 Cellulose nitrate (1/4 sec. visc.)	11.500
Castor oil	2.900
Dibutyl phthalate	1.300
D'cyclohexyl phthalate	0.400
15 Titanium dioxide	1.100
Zinc oxide	0.200
High solvency petroleum naphtha (95-135° C.)	27.683
Butyl acetate	20.400
20 Denatured ethyl alcohol	9.700
Methyl ethyl ketone	10.400
Butyl alcohol	3.900
High solvency petroleum naphtha (135-190° C.)	1.000
25 Petroleum naphtha	9.500
Cetyl pyridinium bromide	0.017
	100.000

This composition which contains a proportion of white pigment was employed as an intermediate coating in the system used in finishing bowling pins as hereinafter described.

Example 2

	Per cent by weight
35 Cellulose nitrate (1/4 sec. visc.)	11.300
Castor oil	3.200
High solvency petroleum naphtha (95-135° C.)	28.286
40 Butyl acetate	21.000
Denatured alcohol	10.500
Methyl ethyl ketone	10.100
Butyl alcohol	4.100
High solvency petroleum naphtha (135-190° C.)	1.100
45 Petroleum naphtha	10.400
Cetyl pyridinium bromide	.014
	100.000

50 In the finishing of bowling pins a suitable preferred system includes first the application of one coat of a penetrating primer of the type described in a co-pending Overholt application, S. N. 296,762, filed September 27, 1939. One coat of Ex-

55 ample 1 is then sprayed over the primer after it

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has dried and this is followed by a final top coat of Example 2.

Several bowling pins were sprayed over the entire surface with one coat of a penetrating primer of the following composition:

	Per cent by weight
Polyvinyl butyral resin ¹ -----	4.5
Cellulose nitrate (1/4 sec. visc.)-----	1.5
Shellac (wax-free) -----	1.5
Denatured ethyl alcohol-----	42.2
Butyl acetate -----	21.8
Butyl alcohol -----	5.0
High solvency petroleum naphtha (95-135° C.) -----	23.5
	100.0

¹ The polyvinyl butyral resin used in this example was characterized by a viscosity at 25° C. of about 3000 centipoises in the following formula:

	Per cent by weight
Polyvinyl butyral resin-----	20
Denatured ethyl alcohol-----	52
Toluene -----	28
	100

After the primer coat had dried, one coat of the composition of Example 1 was sprayed over one-half of the surface of bowling pins divided through the vertical axis and after this coating had dried, a final coating of the composition of Example 2 was sprayed over the coating from Example 1. The remaining half of the surface of bowling pins already coated with the above described primer was sprayed with one coat of a composition identical with that of Example 1 except that the cetyl pyridinium bromide ingredient was omitted and with a top coat identical with Example 2 except for the omission of the cetyl pyridinium bromide.

These pins were then tested in an automatic bowling alley for a service period amounting to 500 "lines." Examination of the pins after this test showed surprising superiority for the new system in that the surface area finished with the compositions containing the cetyl pyridinium bromide showed practically no dirt pick-up with no resultant discoloration and decrease in visibility whereas in the surface area finished with the unmodified compositions, dirt collection near the point of greatest circumference where impact and friction forces are mostly encountered, was severe. The dirt particles were embedded in the finish, making the contamination difficult if not impossible to remove, thus necessitating complete re-finishing of the pin for any further service.

The particular system given above for the finishing of bowling pins represents a commercially acceptable system. However, the invention is not limited thereto since the sequence of steps and the character of the compositions may vary considerably. In some instances, the finishing system may require the use of clear vehicles for the complete finish and in others, the finish may be entirely pigmented. The number of coats may also be varied and other types of primers or sealers may be used. It is essential, however, that at least the top coat include as an essential ingredient an anti-dirt collecting agent of the type herein described in order to secure the stated advantages of the invention.

Other similar tests using cellulose derivative compositions containing lauryl pyridinium chloride as the anti-dirt collecting agent conclusively showed that this material was as equally effective as the agent suggested in the examples and may be directly substituted therein. In general

halides of aliphatic long chain derivatives of heterocyclic nitrogen bases in which the aliphatic radical contains at least 8 carbon atoms and is linked directly to the nitrogen atom, such as described in U. S. Patent 2,192,956, are useful in the present invention. Compounds of this type containing between 10 and 18 carbon atoms are preferred. Cetyl pyridinium iodide, hexadecyl pyridinium bromide, octa-decyl pyridinium bromide and dodecyl pyridinium chloride are representative of the class of agents that may be employed. Cetyl pyridinium bromide and lauryl pyridinium chloride have proven to be particularly effective.

In the examples, the agent is present in an amount of 0.1% by weight of the total solids of the composition. Satisfactory results may be obtained, however, in amounts ranging from about 0.02% to 0.2% by weight of the total solids content of the composition although in general it is preferred to use about 0.1% of the agent based on the total solids content of the coating composition. Amounts greater than 0.2% can be tolerated but no particular advantage becomes apparent with higher proportions.

The invention is useful with other cellulose derivative compositions including cellulose ethers, cellulose acetate and the mixed cellulose esters. The compositions may also contain coloring matter or not as desired.

In the claims the term "cellulose derivative" is used in its commonly accepted sense in the art and includes derivatives which are inherently water-insoluble and produces tough, durable films.

As indicated in the examples, best performance is secured when the compositions are free of resin but if it is desired to include ingredients of this type, the amount should be very small. Plasticizers and/or softeners may be employed in the new compositions but for best results, this type of ingredients should also be kept at a minimum proportion, preferably for 10 parts of cellulose nitrate from between about 2 and 4 parts of plasticizer. The optimum ratio is 10 parts of cellulose nitrate to about 3 parts of plasticizer.

The invention is broadly useful in the finishing of articles where any substantial amount of dirt collection cannot be tolerated. It is particularly and importantly useful where the finished article is subjected to impact and/or frictional forces in the presence of dirt particles such as is encountered in the normal usage of bowling pins and it is to this utility that the present invention is particularly directed. The compositions are also of merit in the finishing of wooden handles and spinning bobbins where frictional forces are also encountered.

The primary advantage of the invention resides in the surprising resistance to dirt pick-up by surfaces coated with compositions containing small quantities of the agents herein described. Articles finished with these compositions have a longer useful life. The original visibility of articles carrying the modified compositions is retained for extended periods of time since there is practically no contamination or discoloration from dirt collection. The incorporation of small amounts of the anti-dirt collecting agents does not in any way detract from the normal appearance or durability of the finish. Bowling pins finished in accordance with the present invention are outstandingly superior in service when compared to pins finished with conventional systems.

It is apparent that many widely different embodiments of the invention may be made without

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departing from the spirit and scope thereof; and, therefore, it is not intended to be limited except as indicated in the appended claims.

I claim:

1. An improved substantially clear coating composition particularly adapted for finishing bowling pins and the like, comprising a cellulose derivative selected from the group consisting of cellulose esters and cellulose ethers and an anti-dirt collecting agent consisting of a halide of an aliphatic long chain derivative of a heterocyclic nitrogen base in which the aliphatic radical is linked directly with the nitrogen atom, said composition being substantially resin-free.

2. Composition of claim 1 in which the cellulose derivative is cellulose nitrate.

3. Composition of claim 1 in which the anti-dirt collecting agent is cetyl pyridinium bromide.

4. Composition of claim 1 in which the anti-dirt collecting agent is lauryl pyridinium chloride.

5. Composition of claim 1 in which the aliphatic radical in the anti-dirt collecting agent contains between 10 and 18 carbon atoms.

6. Composition of claim 1 in which the anti-dirt collecting agent is present in an amount between about 0.02 and 0.2% by weight of the total solids content of the composition.

7. An improved substantially clear coating composition particularly adapted for finishing bowling pins and the like, comprising cellulose nitrate, a plasticizer for the cellulose nitrate in the proportion of about 3 parts of plasticizer for each 10 parts of cellulose nitrate and an anti-dirt collecting agent consisting of a halide of an aliphatic long chain derivative of a heterocyclic nitrogen base in which the aliphatic radical is linked directly with the nitrogen atom, said composition being substantially resin-free.

8. An improved bowling pin highly resistant to dirt pick-up carrying as a surface coating a cellulose derivative composition comprising a substantially clear cellulose derivative selected from the class consisting of cellulose ethers and cellulose esters and an anti-dirt collecting agent consisting of a halide of an aliphatic long chain derivative of a heterocyclic nitrogen base in which the aliphatic radical is linked directly with the nitrogen atom.

9. An improved bowling pin highly resistant to dirt pick-up carrying as a surface coating a cellulose derivative composition comprising a substantially clear cellulose derivative selected from the class consisting of cellulose ethers and cellulose esters and an anti-dirt collecting agent con-

sisting of a halide of an aliphatic long chain derivative of a heterocyclic nitrogen base in which the aliphatic radical contains at least 8 carbon atoms and is linked directly with the nitrogen atom.

10. An improved bowling pin highly resistant to dirt pick-up carrying as a surface coating a cellulose derivative composition comprising a substantially clear cellulose derivative selected from the class consisting of cellulose ethers and cellulose esters and an anti-dirt collecting agent consisting of a halide of an aliphatic long chain derivative of a heterocyclic nitrogen base in which the aliphatic radical contains between 10 and 18 carbon atoms and is linked directly with the nitrogen atom.

11. An improved bowling pin highly resistant to dirt pick-up carrying as a surface coating a cellulose derivative composition comprising a substantially clear cellulose derivative selected from the class consisting of cellulose ethers and cellulose esters and an anti-dirt collecting agent consisting of cetyl pyridinium bromide.

12. An improved bowling pin highly resistant to dirt pick-up carrying as a surface coating a cellulose derivative composition comprising a substantially clear cellulose derivative selected from the class consisting of cellulose ethers and cellulose esters and an anti-dirt collecting agent consisting of lauryl pyridinium chloride.

13. An improved bowling pin highly resistant to dirt pick-up carrying as a surface coating a cellulose derivative composition comprising a substantially clear cellulose derivative selected from the class consisting of cellulose ethers and cellulose esters and an anti-dirt collecting agent consisting of a halide of an aliphatic long chain derivative of a heterocyclic nitrogen base in which the aliphatic radical is linked directly with the nitrogen atom in an amount between 0.02% and 0.2% by weight of the total solids content of the composition.

14. An improved bowling pin highly resistant to dirt pick-up carrying as a surface coating a substantially pigment and resin-free cellulose nitrate composition comprising a cellulose nitrate and an anti-dirt collecting agent consisting of a halide of an aliphatic long chain derivative of a heterocyclic nitrogen base in which the aliphatic radical contains between 10 and 18 carbon atoms and is linked directly with the nitrogen atom in an amount between 0.02% and 0.2% by weight of the total solids content of the composition.

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