COATED ARTICLE AND METHOD OF FORMING THE SAME


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ABSTRACT

A coated article such as a bowling pin and method of forming such a coated article. The article may comprise an extended life bowling pin having portions of different wear susceptibility wherein those portions having greatest wear susceptibility are provided with thickest coating portions. The method comprehends an electrostatic retention of the coating forming material delivered to the article body from a charged cloud thereof. The cloud formation and electrostatic potential are coordinated to effect the desired coating thickness control. The coating material is fused subsequent to the deposition to form a variable depth coating having an external configuration accurately defining the coated article.

3 Claims, 4 Drawing Figures
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COATED ARTICLE AND METHOD OF FORMING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to coating of articles such as bowling pins and the like and in particular to method of forming coatings thereon.

2. Description of the Prior Art

One method of coating objects, such as bowling pins, utilized heretofore in the coating art, has been to form a fluidized bed of coating material and introduce a heated object to be coated momentarily into the bed to cause the fluidized material to fuse on the surface of the heated object. Another method of coating articles with a fluidized material has been to suspend the object above a fluidized bed and electrostatically cause the coating particles to rise from the upper surface of the bed to the superjacent article solely as a result of the electrostatic attraction. Further, it is known to cause the deposit of a coating from a cloud of particles formed solely by electrostatic charges.

SUMMARY OF THE INVENTION

The present invention comprehends an improved method of coating articles and in particular a method of forming an article such as an extended life bowling pin wherein a coating is provided on the article by delivering the material to the article as a result of the formation of a cloud of the coating material surrounding the article. The coating material is caused to remain adhered to the article by a controlled electrostatic attraction for subsequent fusing of the coating material on the article surface. By this means, the article may have a coating wherein the greatest depth of the coating may be at a greatest wear susceptibility portion. Illustratively, the article is a bowling pin, the greatest depth is at the rounded portions of the head and belly of the pin where greatest wear normally occurs in use. The resultant product is suitably caused to have an external configuration accurately defining the desired coated article.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

FIG. 1 is a schematic isometric view with portions broken away illustrating a method of forming a coated article embodying the invention;

FIG. 2 is a fragmentary vertical section thereof;

FIG. 3 is a schematic view illustrating the step of fusing of the coating material on the article; and

FIG. 4 is an elevation of a bowling pin embodying the invention with a portion broken away to show the coating thereon.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the exemplary embodiment of the invention as disclosed in the drawing, a method of forming a coated article is shown to comprise the steps of disposing an article 10 to be coated in a cloud 11 of coating material, causing the coating material to be retained on the article 10 by electrostatic means generally designated 12 in the form of a thin layer 13. The deposited layer 13 is then fused by suitable fusing means generally designated 14 to define the coated article 15. In the illustrated embodiment, the coated article 15 comprises a coated bowling pin having a wood body 10, comprising a suitable plastic material, such as cellulose acetate butyrate, ethyl cellulose, etc.

As shown in FIG. 1, body 10 is disposed in a cloud chamber 16 defined by a cabinet 17 and is supported on a rotatable carrier 18 to extend axially horizontally in the chamber. Carrier 18 may be rotated by suitable means, illustratively shown as an electric motor 19 and belt drive 20. The drive system may be carried on a suitable base 21 which is electrically connected to the carrier 18 by suitable conductive axle 22. Carrier 18 is arranged to support body 10, as shown in FIG. 2, at the upper boundary of a cloud 11 of plastic powder which may be produced by introduction of air under pressure through an inlet 23 below a foraminous plate 24 which carries a quantity 25 of the powdered plastic. The air passing upwardly through the powdered plastic forms the cloud 11 surrounding the lower portion of the pin. Illustratively, where the powdered plastic comprises cellulose acetate butyrate or ethyl cellulose, it may have a particle size of approximately 20 to 300 microns. A preferred size range is from approximately 50 to 150 microns. With such powder, the air may be introduced at a pressure of approximately 1 pound per square inch to provide the desired cloud 11.

Thus, the cloud 11 delivers the powder only to the downwardly disposed portion of the pin body 10 as it rotates. To cause the powder to be retained on the body 10 for subsequent fusing, an electrostatic charge may be imparted to the powdered material adjacent plane 24. More specifically, as shown in FIG. 1, the electrostatic charging means 12 may include a zigzag grid assembly 26 of bare wires 27 carried on suitable insulating supports 28. A high voltage power supply 29 is connected through a positive lead 30 to the support base 21 and through a negative lead 31 to the wires 27. Power supply 29 preferably comprises an electrostatic charging device producing a voltage differential between the grid assembly 26 and the pin body 10 of at least approximately 30 kilovolts to effect the desired retention while yet precluding the charging effect from controlling the deposition and causing a substantially uniform depth of deposition. A current limiting resistor 32 may be provided in the power supply lead 31 for controlling the current flow through the system.

Thus, the article 10 may be provided with a coating of plastic material by depositing the powdered plastic onto the surface of the article whereon it is retained electrostatically. It is preferable that the article have a limited conductivity to effect the desired particle retention. Illustratively, where the product comprises a bowling pin, the article 10 may be formed of wood having a moisture content of approximately 6 to 9 percent. Where low conductivity articles are to be coated by the disclosed method, surface treatment, as by prior coating of the surface with a conductive material, may be effected prior to the plastic coating operation. The article 10 is slowly rotated in the cloud 11 to assure a desired deposition of the powdered plastic on the outer surface thereof. The enlarged portions 10a and 10b of the article effectively define areas of electrostatic concentration whereby a thicker coating of the powdered plastic is retained thereon as compared to the thickness of the coating at other portions of the article. Where the article 10 comprises a bowling pin, the belly portion 10b and head portion 10a comprise surface portions of relatively large wear susceptibility and, thus, the disclosed process provides an improved bowling pin wherein the greatest depth of the coating is at the areas of greatest wear susceptibility. As discussed above, the electrostatic charge retains the powdered plastic on the article 10 to permit subsequent fusion thereof by a suitable fusing step. Illustratively, the retained powdered plastic may be fused by treatment in fusing means 14 with a suitable solvent vapor 33, such as trichloroethylene, in a suitable tank 34, as shown in FIG. 3. The resultant bowling pin 15 thus is provided with a variable thickness coating 35 which is bonded to the base article 10 to define an improved extended life bowling pin with the greatest depth of the protective plastic coating being provided at the greatest wear susceptibility portions, which are portions 30 and 35 corresponding to portions 10a and 10b of the base article 10. The deposition may be suitably controlled to assure that the bowling pin 15 has an external configuration accurately defining the desired pin. The coating defines an externally hard wear resistant layer throughout, providing long, useful life at effectively minimum cost.

The invention comprehends the provision of cloud 11 from the mass of powdered plastic 25 independently of the electro-
The static charge means 12. Thus, in the disclosed method of forming the coated article, the powdered plastic is delivered to the article by the mechanism of flowing air, in contradistinction to known methods of coating articles by electrostatic attraction. In the present method, the particles are caused to be retained on the article surface by the electrostatic charges.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

We claim:

1. A method of coating a bowling pin comprising the steps of:
   - providing an uncoated bowling pin body having an external configuration similar to and slightly smaller than the pin to be formed;
   - providing a fluidized bed of particles of a plastic coating material subjacent said body;
   - supporting said pin body substantially horizontally above said fluidized bed;
   - introducing into said fluidized bed an excess amount of fluid sufficient to form from said fluidized bed a superjacent cloud of said powdered plastic material and to cause said cloud to extend upwardly and surround the lower portions of said horizontal pin body;
   - causing an electrostatic potential to exist between said plastic coating material in said cloud and said pin body, rotating said pin body about its longitudinal axis and through said cloud of particles of plastic coating material so that said plastic coating material is caused to be electrostatically retained on the pin body with a thicker coating at the belly and head portions of the pin body; and
   - fusing said retained plastic coating material to form a coating on said pin body, said coated pin body having an external configuration conforming to that of a desired finished pin.

2. The method of claim 1 wherein said cloud is formed to have said plastic coating material move toward said pin body preponderantly generally in one direction.

3. The method of claim 1 wherein said cloud of powdered plastic material is formed to have said coating material move upwardly to said body.

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