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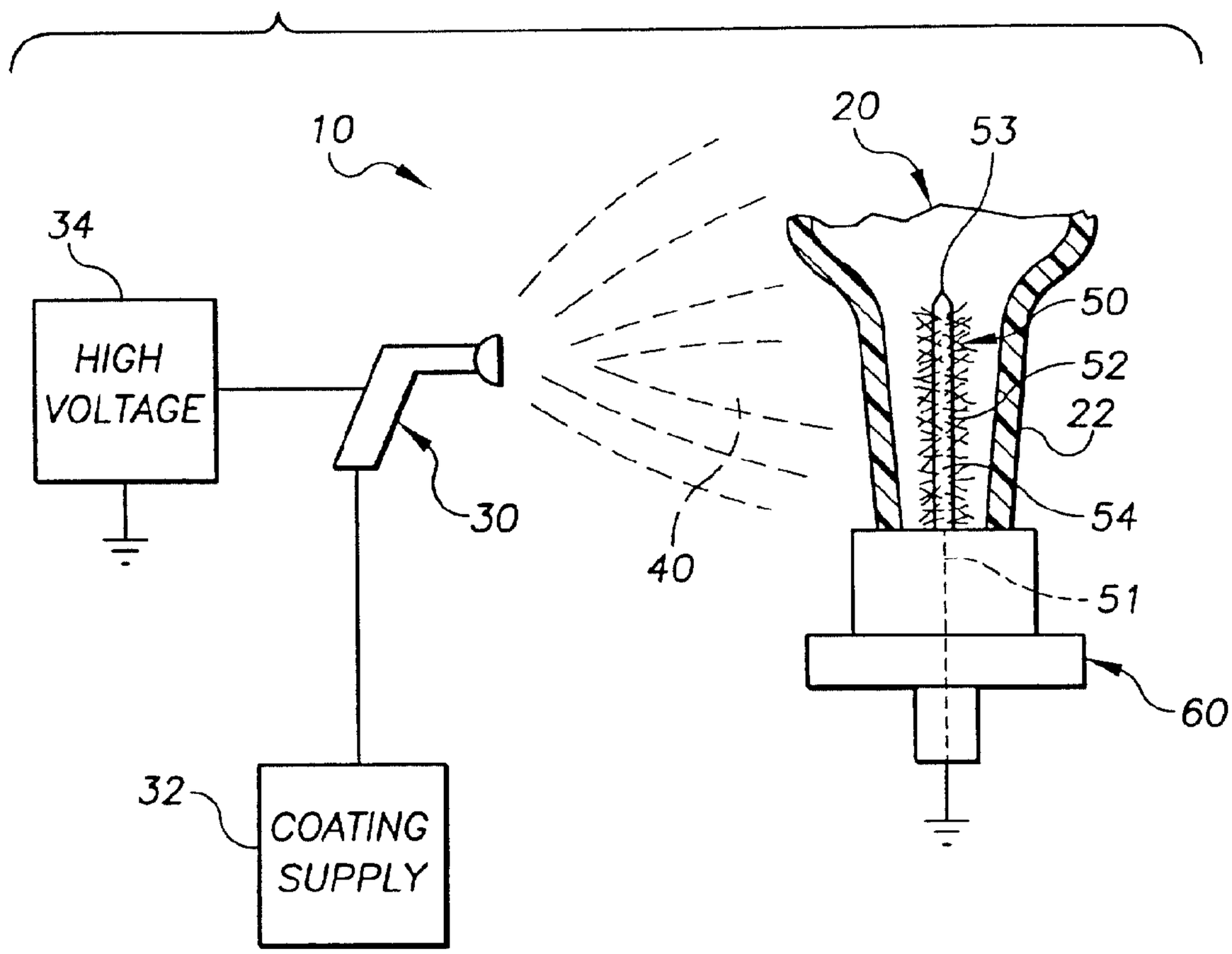
(54) Title: ELECTROSTATICALLY COATING NON-CONDUCTIVE BOTTLES



(57) Abrégé/Abstract:
A system and method for electrostatically coating non-conductive articles and particularly non-conductive containers and bottles with an electrostatic dispenser disposed on one side of the article, and an electrode at an electrical potential different from that of the coating dispenser on an opposite side of the article as the coating dispenser, the electrode preferably includes a plurality of discrete conductive protrusions extending therefrom, and may be disposed for example within an opening of the non-conductive container.

"Electrostatically Coating Non-Conductive Bottles" Atty. Docket No. 965

ABSTRACT

A system and method for electrostatically coating non-conductive articles and particularly non-conductive containers and bottles with an electrostatic dispenser disposed on one side of the article, and an electrode at an electrical potential different from that of the coating dispenser on an opposite side of the article as the coating dispenser, the electrode preferably includes a plurality of discrete conductive protrusions extending therefrom, and may be disposed for example within an opening of the non-conductive container.

Atty. Docket No. 965

ELECTROSTATICALLY COATING NON-CONDUCTIVE BOTTLES

BACKGROUND OF THE INVENTION

The invention relates generally to electrostatic coating, and more particularly to processes and systems for electrostatically coating non-conductive articles.

It is known generally to electrostatically coat non-conductive articles. U.S. Patent No. 5, 830,274 entitled "Electrostatic Deposition of Charged Coating Particles Onto A Dielectric Substrate", for example, discloses an electrostatic coating system having a pointed electrode with screw-like projections protruding therefrom disposed in a non-conductive bottle for drawing electrically charged paint onto an outer surface thereof.

An object of the present invention is to provide novel processes and systems for electrostatically coating non-conductive articles that improve upon and overcome problems in the prior art.

Another object of the invention is to provide novel electrostatic coating processes and systems for non-conductive articles having improved efficiency.

A further object of the invention is to provide novel electrostatic coating processes and systems having improved coating coverage, particularly on non-conductive articles, for example non-conductive bottles.

Another object of the invention is to provide novel electrostatic coating processes and systems for non-conductive containers comprising an electrode with a plurality of bristles disposed in the container to draw a charged coating onto an outer surface thereof.

It is yet another object of the invention to provide novel electrostatic coating processes and systems for non-conductive containers having an electrode comprising water disposed within the container to draw a charged coating onto an outer surface thereof.

A more particular object of the invention is to provide novel systems for electrostatically coating non-conductive articles generally comprising an electrostatic dispenser on one side of the non-conductive article, and an electrode at an electrical potential different

from that of the coating dispenser on an opposite side of the article as the coating dispenser, the electrode having a plurality of discrete conductive protrusions extending therefrom.

Another more particular object of the invention is to provide novel systems for electrostatically coating non-conductive articles generally comprising an electrostatic coating dispenser on one side of the article, and a conductive fluid at an electrical potential different from that of the coating dispenser disposed on an opposite side of the article as the dispenser.

These and other objects, aspects, features and advantages of the present invention will become more fully apparent upon careful consideration of the following Detailed Description of the Invention and the accompanying Drawings, which may be disproportionate for ease of understanding, wherein like structure and steps are referenced generally by corresponding numerals and indicators.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exemplary system for electrostatically coating non-conductive articles.

FIG. 2 is an alternative electrode configuration for electrostatically coating non-conductive articles.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 illustrates a system 10 for electrostatically coating non-conductive articles, for example glass and plastics and other dielectric materials, and particularly non-conducting containers having openings. In the exemplary application, the container is a plastic bottle 20 having a neck portion 22 with the opening thereon.

The system 10 generally comprises an electrostatic coating dispenser 30, for

example the Aerobell-33 coating applicator by ITW Ransburg, Indianapolis, Indiana, that dispenses an electrostatically charged coating material supplied from a supply 32 toward the non-conductive article. The coating dispenser 30 is generally coupled to a high voltage supply 34 that imparts electrostatic charge to the coating material.

In FIG. 1, an electrode 50 at an electrical potential different from that of the electrostatic coating dispenser 30 is disposed generally on an opposite side of the non-conductive article as the coating dispenser 30, thereby drawing the charged coating material toward the non-conductive article. In the exemplary application, the electrode 50 is disposed least partially in the non-conductive container or bottle 20, thus drawing the charged coating material toward an outer surface thereof.

In the exemplary embodiment, the electrode 50 is coupled to ground potential by a conductive element 51. The electrode 50 and the conductor 51 may for example be mounted in an insulated work holder 60 suitable for holding the container 20 during the coating operation, as is known to those of ordinary skill in the art.

The electrode generally comprises a plurality of discrete conductive protrusions extending therefrom. The discrete conductive protrusions preferably have pointed tips, and in one embodiment the plurality of discrete protrusions are a corresponding plurality of electrically conductive bristles.

In the exemplary embodiment, the electrode comprises an axial member 52 with a tip 53, and a plurality of bristles 54 protruding generally radially from the axial member 52. For some applications, including the exemplary bottle coating application, the electrode may be in the form of a commercially available metal brush.

In the exemplary bottle coating application, the electrode and the bristles thereof are disposed at least partially into the neck portion 22 of the bottle 20.

In the embodiment of FIG. 2, a conductive fluid 70 is disposed in the non-conductive container 20 and is in electrical contact with the conductive element 51 of the work holder 60, which holds the non-conductive container. The work holder 60 may be configured with a sealing member to prevent leakage of the conductive fluid therefrom when the container

20 is inverted or may be configured to suspend the container 20 upright.

In one embodiment, the conductive fluid is water, but other conductive fluids and conductive additives may be used alternatively. In one application, the non-conductive container 20 is filled with the conductive fluid.

The conductive fluid 70 generally draws the charged coating material dispensed from the coating dispenser 30 toward the non-conductive container 20, whereby the coating material is relatively efficiently deposited on an outer surface thereof.

While the foregoing written description of the invention enables one of ordinary skill to make and use what is considered presently to be the best mode thereof, those of ordinary skill will understand and appreciate the existence of variations, combinations, and equivalents of the specific exemplary embodiments herein. The invention is therefore to be limited not by the exemplary embodiments herein, but by all embodiments within the scope and spirit of the appended claims.

"Electrostatically Coating Non-Conductive Bottles" Atty. Docket No. 965

CLAIMS

What is claimed is:

1. A system for electrostatically coating non-conductive articles, comprising:

an electrostatic coating dispenser disposed on one side of the article;

an electrode at an electrical potential different from that of the electrostatic coating dispenser disposed on an opposite side of the article as the coating dispenser;

the electrode having a plurality of discrete conductive protrusions extending therefrom.

2. The system of Claim 1, the discrete protrusions are a plurality of electrically conductive bristles.

3. The system of Claim 2, the electrode having an axial member with a tip, the plurality of bristles protruding generally radially from the axial member.

4. The system of Claim 3, the non-conductive article is a bottle having a neck portion with an opening, the electrode is disposed at least partially into the bottle.

5. The system of Claim 1, the electrode is a metal brush.

6. The system of Claim 1, the discrete protrusions have pointed tips.

7. The system of Claim 1, the non-conductive article is a container having an opening, the electrode is disposed in the container.

8. A system for electrostatically coating non-conductive articles, comprising:

an electrostatic coating dispenser;

a non-conductive container having an opening;

a conductive fluid disposed in the non-conductive container at an electrical potential different from that of the dispenser.

9. The system of Claim 8, a work holder having a conductive element at an electrical potential different from that of the dispenser, the non-conductive container held by the work holder, the conductive fluid in the non-conductive container in electrical contact with the conductive element of the work holder.

10. The system of Claim 8, the conductive fluid is water.

11. The system of Claim 8, the non-conductive container is filled with the conductive fluid.

12. The system of Claim 9, the non-conductive container is a bottle having a

neck portion with the opening thereon.

13. The system of Claim 12, the bottle is filled with the conductive fluid.

14. The system of Claim 12, the bottle is plastic.

15. The system of Claim 12, the conductive fluid is water.

16. A method for electrostatically coating non-conductive articles comprising:

dispensing an electrostatically charged coating material toward one side of the non-conductive article with an electrostatic dispenser;

drawing the coating material toward the non-conductive article with an electrode having a plurality of discrete conductive protrusions disposed on an opposite side of the article as the coating dispenser;

depositing the coating material on a surface of the non-conductive article.

17. The method of Claim 16, the non-conductive article is a container having an opening, drawing the coating material toward the non-conductive container with an electrode having a plurality of discrete conductive protrusions with pointed tips disposed in the container.

18. The method of Claim 16, the non-conductive article is a bottle having a

neck portion with the opening thereon, drawing the coating material toward the bottle with an electrode having a plurality of bristles protruding generally radially from an axial member, the electrode disposed in the neck portion of the bottle.

19. A method for electrostatically coating a non-conductive container, comprising:

dispensing an electrostatically charged coating material toward the container from an electrostatic dispenser;

drawing the coating material toward the container with a conductive fluid disposed in the container,

the conductive fluid at an electrical potential different from that of the dispenser;

depositing the coating material on an outer surface of the non-conductive container.

20. The method of Claim 19, drawing the coating material toward the non-conductive container with water disposed in the container.

FIG. 1

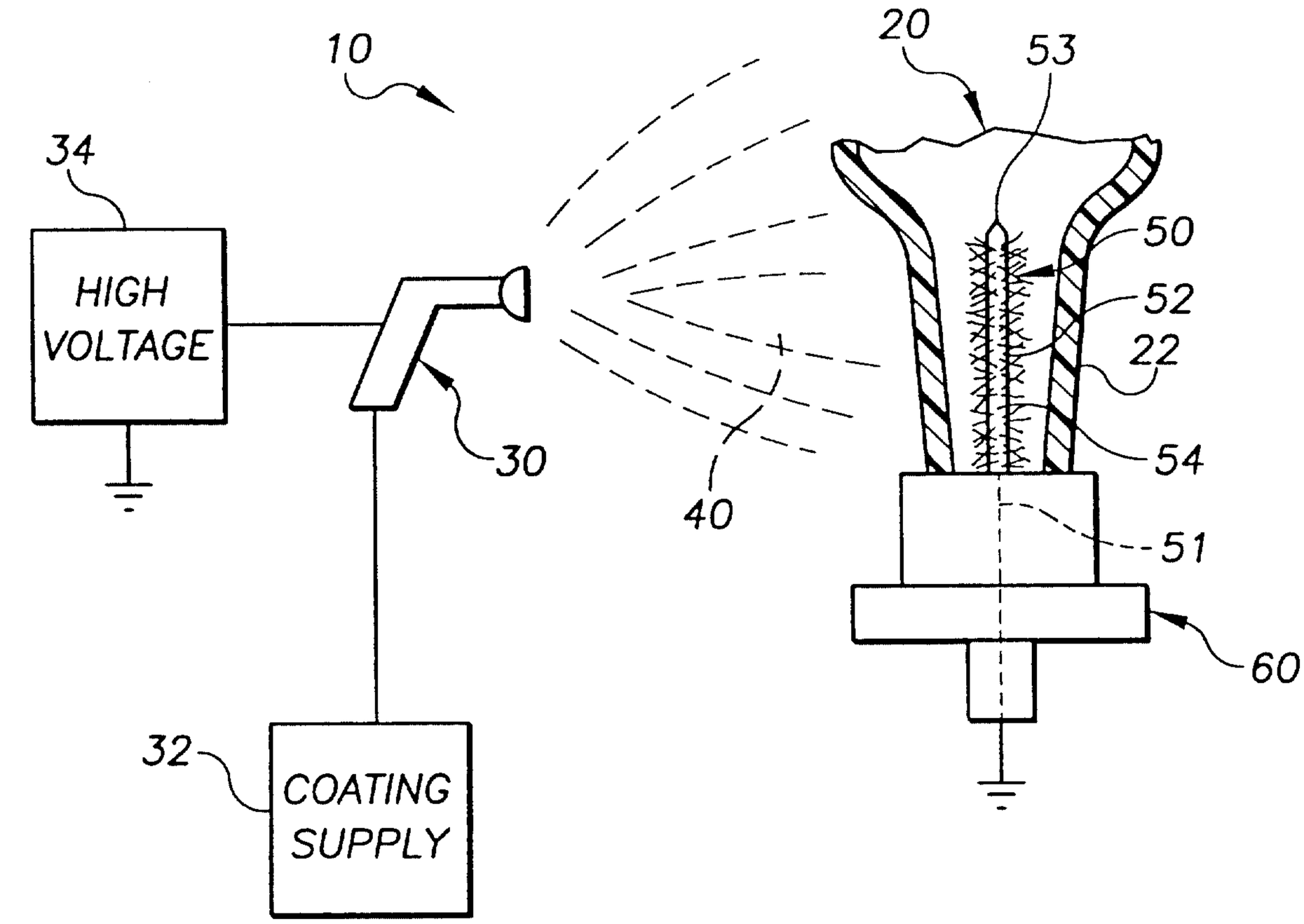
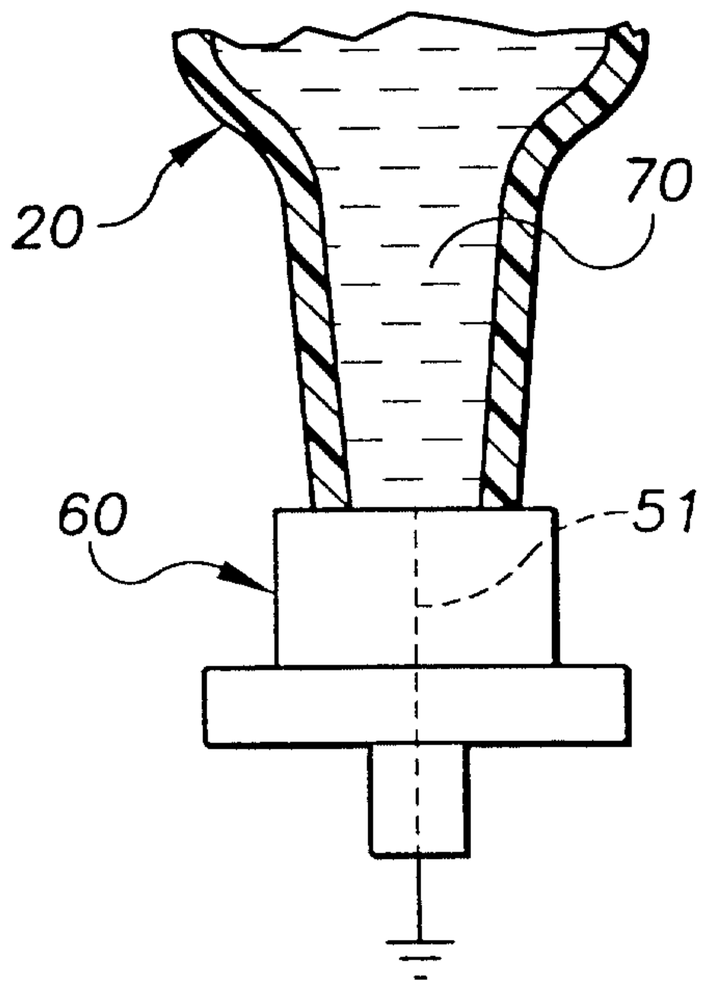


FIG. 2



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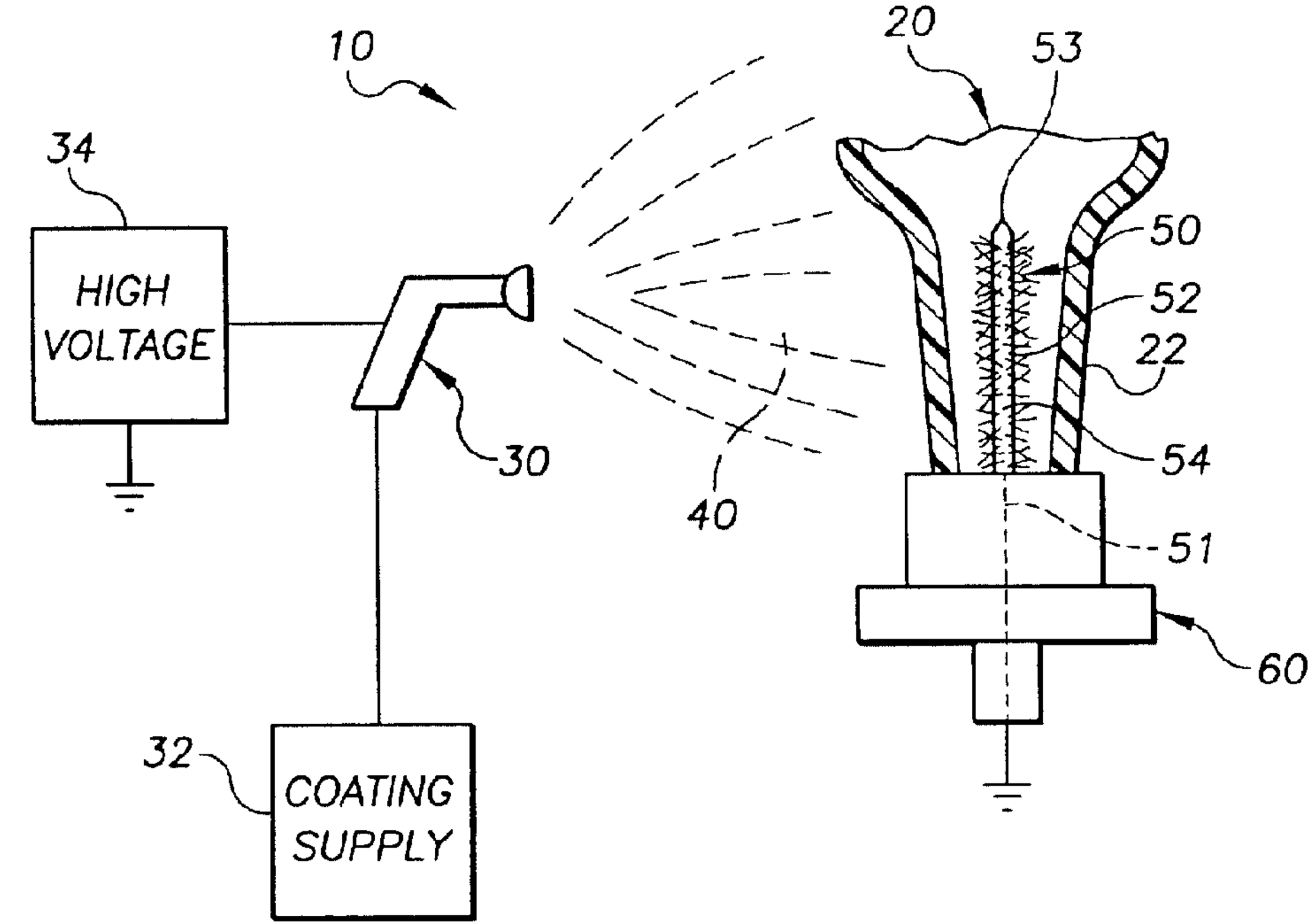
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HIGH VOLTAGE
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COATING SUPPLY