Sept. 1, 1953 L. W. SPOONER 2,650,565

COATING MACHINE AND ELECTRODE PANEL THEREFOR

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Fig. 1.

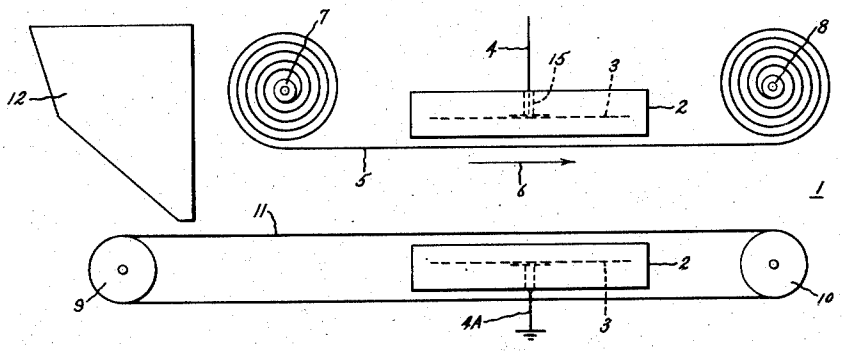
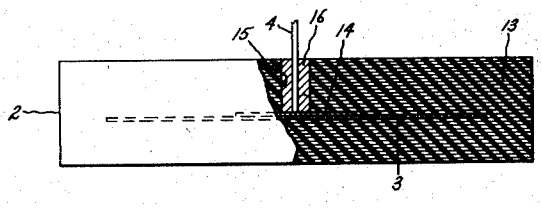


Fig. 2.



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COATING MACHINE AND ELECTRODE PANEL THEREFOR

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3 Claims. (Cl. 118—51)

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My invention relates to a machine for coating sheet material with comminuted material in an electrostatic field to produce felt and has for its object the provision of low corona electrodes for use in such a machine.

Another object of my invention is to provide electrodes encased in an ionization-free medium.

Machines of this character include a pair of spaced electrodes between which a strip of a base material and a portion of an endless belt are simultaneously moved in the same direction within the machine. The underside of the base material strip is covered with an adhesive material. The belt portion continually carries fibers from the outlet of a hopper mounted upon the machine into position between the electrodes which are energized to provide an electrostatic force therebetween. The fibers are attracted to the adhesive surface of the base there to become perpendicularly attached by means of the adhesive material, to form a felt strip. This method of attaching particles to an adhesive surface is also used in the manufacture of abrasive papers and cloths to cause the particles of abrasive to stick with their long axes perpendicular to the bases so that sharp cutting points project from the surfaces of the finished products.

For effective operation of such a machine, the distance between electrodes is less than three inches with an applied voltage of from 60 to 100 kilovolts. In order to accommodate the moving strip and the moving belt, a minimum distance of one-half inch between electrodes is required. The machine with bare electrodes has been operated in a chlorinated gas atmosphere to raise the dielectric breakdown value, but even then it was found that corona formed around the electrodes of the machine at a voltage gradient too low to attract the particles to the base strip effectively. It was found, in addition, that corona voltage varies substantially directly with the distance between electrodes within ½ to three inches spacing and that corona frequently starts at a voltage but slightly less than the arc-over or puncture voltage between electrodes. After operation of the machine over a period, corona was found to have burned the insulation of the machine excessively.

According to my invention, the metal electrodes formerly used in this machine are replaced by electrode panels each comprising a sheet of conducting material inserted within insulation material and compressed so that the conducting material is enclosed in an ionization-free medium. The panels are mounted in the machine

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with the conducting material connected by leads to a source of power to form the electrodes of the machine. It was found that the corona starting voltage for a machine in which the electrode panels were installed to replace bare electrodes was nearly tripled.

An object of my invention is to provide electrode panels embodying these features.

Another object of my invention is to provide electrode panels to raise the corona starting voltage of the machine.

A further object of my invention is to provide electrode panels, each comprising a flat sheet of conductive material wholly embedded in a panel between laminated sheets of insulation material.

A still further object of my invention is to provide electrodes enclosed in an insulating material so that upon installation of such electrodes there can be no ionizable atmosphere adjacent thereto.

For a better understanding of my invention, reference is directed to the accompanying drawing of one embodiment of my invention in which Fig. 1 is a schematic view of a felt coating machine embodying my invention; Fig. 2 is a sectional view of an electrode panel mounted in the coating machine.

Referring to the drawing, a coating machine 1 is provided with panels 2 enclosing electrodes 3, one of which is connected by a lead 4 to a grounded source of direct current power and the other of which is electrically grounded at 4A, to provide an electrostatic field between panels 2.

A strip 5 of material to form the base of the felt being produced by the machine is moved in the direction of arrow 6 from supply reel 7 and is wound upon reel 8 by motor means (not shown). The under surface of strip 5 is coated with an adhesive material. An idler pulley 9 and a drive pulley 10 operate to drive a continuous belt in the direction of arrow 6 at the same speed that strip 5 moves. The upper portion of the belt between pulleys 9 and 10 extends beneath strip 5 and a storage hopper 12 mounted so as to be capable of receiving fiber from outside the machine.

As the machine is operated, fibers from hopper 12 drop on belt portion 11 and thereby are carried between electrode panels 2 to be attracted by the force of the electrostatic field therebetween to the under surface of strip 5. The fibers meet strip 5 in a position perpendicular to the surface thereof and are held in this position by the adhesive material thereon.

Electrode panels 2 are constructed by piling sheets of insulation 13 together to form a stack,

A sheet of semi-conducting material 3 and a substantially two inch square sheet 14 of copper foil in electrical contact with sheet 3 and substantially centered thereon, are inserted between the insulating sheets. Conducting sheet 3 is positioned in the stack so as to be at least one-half inch from the edges of the panel. The stack is pressed at substantially 1,500 pounds per square inch pressure at 160° C., for one hour, after which it is cooled and removed from the press. A hole 15 is a carefully drilled in the panel with a blunt drill to expose copper foil 14. The copper foil is tinned and the hole is filled with solder 16 to provide an adequate means of electrical connection.

An electrode spacing of 1⅜ inches is arbitrarily chosen within the above mentioned one-half inch and three inch electrode spacing limits of the machine. Each electrode 3 is a semi-conductor comprising a sheet of insulating material impregnated with semi-conducting paint and dried.

It was found that corona starting voltage of the electrode panels in an atmosphere of air is substantially 280% of the corona starting voltage of bare metal electrodes having the same spacing.

While certain specific embodiments have been shown and described, it will, of course, be understood that various modifications may be made without departing from the invention. The appended claims are, therefore, intended to cover any such modifications within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An electrode comprising a flat sheet of conducting material, a flat sheet of semi-conducting material substantially larger than said sheet of conducting material lying thereon in contact therewith and extending over the edges thereof, an insulating member completely enclosing said sheets, and an electrical lead connected to said sheet of conducting material at the approximate center thereof on the side opposite the contact area between said sheets and extending without said insulating member along a line substantially perpendicular to the surface of said sheets.

2. In a machine for coating an adhesive covered surface of sheet material with comminuted material, a pair of electrode panels, each panel comprising a flat sheet of conducting material, a flat sheet of semi-conducing material substantially larger than said sheet of conducting material in contact therewith, substantially centered thereon and extending over the edges thereof, a plurality of sheets of insulating material, each substantially larger than said sheet of semi-conducting material, said sheet of conducting material and said sheet of semi-conducting material being sandwiched between said sheets of insulating material and completely enclosed thereby, and an electrical lead connected to said sheet of conducting material at the approximate center thereof on the side opposite the contact area between said sheets and extending without said insulating member along a line substantially perpendicular to said sheet, said panels being arranged in parallel planes and being positioned in said planes so that the sheets of conducting material have the semiconducting layers interposed therebetween, whereby the corona starting voltage between the electrode panels is greatly increased.

3. A machine for coating an adhesive covered surface of sheet material with comminuted material, comprising a hopper for storing comminuted material mounted at one end of said machine, driving means for conducting said sheet material in a horizontal strip within said machine, said strip being conducted with said adhesive surface facing downward, driven endless belt means mounted beneath said hopper and said surface, said belt means serving to convey said comminuted material from said hopper to a position beneath said surface, and a pair of similar laminated electrode panels, one of said electrode panels being mounted above said sheet material and the other of said electrode panels being mounted below said endless belt, each of said electrode panels including a flat sheet of conducting material, a flat sheet of semi-conducting material substantially larger than said sheet of conducting material in contact therewith, substantially centered thereon and extending over the edges thereof, a plurality of sheets of insulating material, each substantially larger than said sheet of semi-conducting material, said sheet of conducting material and said sheet of semi-conducting material being sandwiched between said sheets of insulating material and completely enclosed thereby and an electrical lead connected to said sheet of conducting material at the approximate center thereof on the side opposite the contact area between said sheets and extending without said insulating member along a line substantially perpendicular to said sheet, said panels being arranged in parallel planes and being positioned in said planes so that the sheets of conducting material have the semi-conducting layers interposed therebetween, whereby the corona starting voltage between the electrode panels is greatly increased.

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