

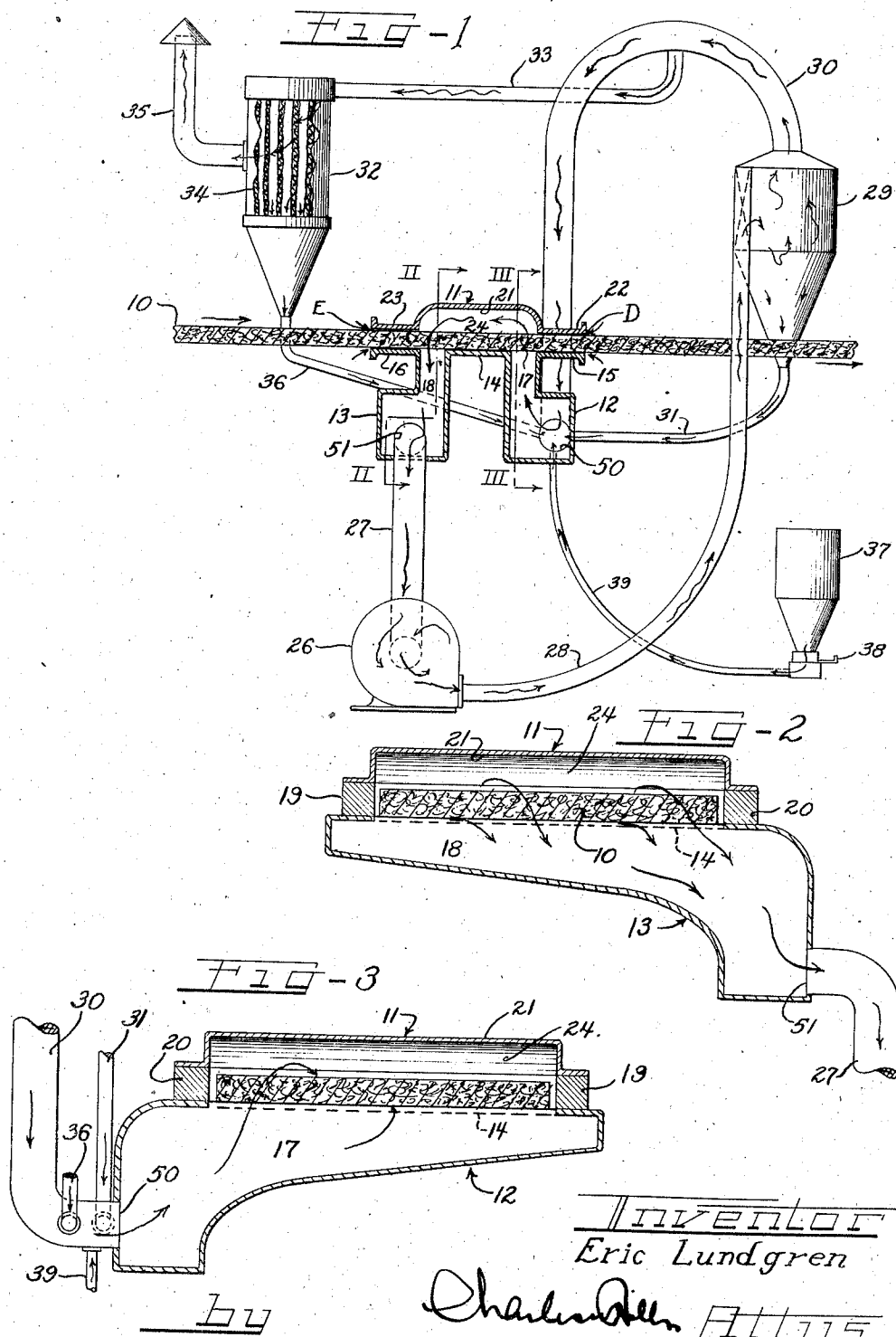
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METHOD OF AND APPARATUS FOR DUSTING FIBROUS MATERIAL

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METHOD OF AND APPARATUS FOR DUSTING
FIBROUS MATERIALEric Lundgren, Braddock Heights, Md., assignor
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This invention relates to a method of and apparatus for dusting fibrous material. More particularly, the invention relates to the dusting with talc, soapstone, or the like, of a traveling web of a rubberized fibrous material to eliminate the stickiness of the rubberized fiber.

In the preparation of webs of rubberized fibrous material, the web of material is sprayed with rubber latex, or the latex otherwise applied thereto, and the moisture eliminated from the latex by evaporation at ordinary temperatures or at the more elevated temperatures of a drying or vulcanizing chamber. Owing to the tacky or sticky nature of the rubberized fibers so produced, it is desirable to dust the material in order to eliminate this residual stickiness. While it would be a simple matter merely to spray or sprinkle a powder against one or both sides of a traveling web of such fibrous material, it is difficult, if not impossible, by merely spraying or sprinkling, to obtain a uniform distribution of the powder throughout the body of the fibrous material, particularly where the fibrous material is of substantial thickness. The tendency is for most of the powder to be retained on the fibers nearest the surfaces of the web against which the powder is applied, with little, if any, of the powder penetrating through to the fibers on the inside of the web.

In accordance with my present invention, I provide a method of and an apparatus for applying a dust, powder, perfume, or other treating agent, in a finely divided form to a porous, open mesh body, such as a web of rubberized fibrous material, whereby the treating agent is uniformly applied to all of the surfaces throughout the entire body of the open mesh material. My process is particularly applicable to the dusting of a rubberized fibrous material with powdered talc or soapstone to obtain complete coverage of the rubberized surfaces so as to prevent undesired sticking of surfaces together.

The machine of my invention is so constructed that the dusting agent is uniformly distributed throughout the body of the fibrous or open mesh material which is to be treated. This is accomplished by suspending the dusting agent in a stream of air or other gas and drawing the thus laden gas stream through the open mesh material, preferably so as to pass completely through the material from opposite sides at spaced points along the travel of the material if it is in web form. The machine further includes a recirculating system for the gas stream, with provision for withdrawing from the system any excess of

gas or air and also with a provision for reincorporating fresh supplies of the dusting agent into the circulating stream of gas or air. The dust laden gas stream is maintained under a subatmospheric pressure during its passage through the web of fibrous open mesh material so as to prevent the escape of the dusting agent from the circulating system.

It is therefore an important object of this invention to provide a method for applying a powder, perfume or other treating agent in finely divided form to open mesh material in such a way that the treating agent is uniformly distributed over the surfaces of the open mesh material even though the latter be relatively thick.

It is a further important object of this invention to provide a method wherein the dusting agent is carried by a stream of gas or air confined within a substantially closed circulating system, with the open mesh material to be impregnated passing through a portion of the system in such a manner that the stream of thus laden gas traverses the open mesh material in opposite directions.

It is a further important object of this invention to provide an apparatus particularly adapted for the application of a powder, perfume, or other finely divided treating agent to a web of open mesh material, with the provision in such apparatus of a housing for substantially enclosing a portion of the web of open mesh material and with the provision also of means for drawing a stream of gas or air laden with the treating agent through said housing and completely through the portion of the web enclosed thereby to effect a uniform distribution of the treating agent throughout the body of said web and upon all surfaces thereof.

It is a further important object of this invention to provide a housing for substantially enclosing a portion of a traveling web of open mesh material, the housing being so constructed as to cause a stream of gas or air laden with a finely divided treating agent to pass completely through the traveling web of open mesh material from opposite sides thereof at spaced points along the travel of the web.

It is a further important object of this invention to provide an apparatus defining a substantially closed circulating system for dust laden air, with means within the system for conducting the stream of such dust laden air, while under subatmospheric pressure, completely through a portion of a traveling web of open mesh material from opposite directions at spaced points along

the travel of said web in order to insure thorough and uniform distribution of the dust upon all surfaces of the open mesh material.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawing.

This invention (in a preferred form) is illustrated in the drawing and hereinafter more fully described.

On the drawing:

Figure 1 is a schematic view, in elevation, of apparatus embodying the principles of my invention.

Figure 2 is an enlarged sectional view taken substantially on the broken line II—II of Fig. 1.

Figure 3 is a fragmentary enlarged sectional view taken substantially on the line III—III of Fig. 1.

As shown on the drawing:

The reference numeral 10 indicates a web of open mesh material, such as rubberized Tampico fiber, hair, or other fibrous material, or sponge rubber, which is to be treated in the apparatus by the method of my invention. Although my method is applicable to the treatment of single sheets or batts of open mesh material, its greater utility lies in the treatment of a continuous traveling web of such material. My invention will therefore be described as a part of a machine, or as a step in a method, for the continuous production of a web of open mesh material. As previously stated, an example of the application of my method is the dusting of a web of rubberized intermingled fibers with talc, soapstone, or the like, or with perfume, during the course of its manufacture.

A housing, generally indicated by the reference numeral 11 serves to substantially enclose a portion of the traveling web 10 while permitting free travel of the web therethrough. Said housing 11 comprises a pair of chambers 12 and 13, positioned below the web 10 and spaced apart by a connecting, horizontal wall portion 14. The chamber 12, constituting an entrance chamber, is provided with an upper horizontal flange or lip 15 extending parallel to and tangentially of the web 10, and the chamber 13 is provided with a similarly disposed flange or lip 16. The upper surfaces of said wall portion 14 and of said lips 15 and 16 serve to support the web 10 in its travel into, through, and out of the housing 11. A transversely extending passageway 17 tapered away from the opening 50 thereinto, opens upwardly from the chamber 12 toward the under surface of the traveling web 10, while a similar passageway 18 extends from the underside of the web into the chamber 13 and is divergently flared toward the exit opening 51.

The side walls of the housing 11 are constituted by a pair of strips 19 and 20, which rest upon the upper walls of the chambers 12 and 13 and which are spaced slightly from the lateral edges of the web 10. A cover or hood 21 rests upon the side members 19 and 20. Said cover 21 is provided with horizontal wall extensions 22 and 23, which together with the horizontally disposed flanges or lips 15 and 16, respectively, form constricted passages through which the web 10 travels with only a minimum of binding effect. The intermediate body portion of the cover 21 is spaced above the web 10 to provide a turning chamber 24 for the gas or air passing therethrough.

A blower 26 is connected by means of a conduit 27 to the exit chamber 13 for drawing a stream of

dust laden air, or gas, through the housing 11. Said blower 26 discharges the dust laden air or gas into a conduit 28 that leads into a conventional type of dust separator 29. From the top of the dust separator 29, a gas conduit 30 leads back into the entrance chamber 12. A dust return line 31 leads from the bottom of the dust collector 29 also to the chamber 12.

In order to remove from the circulating system any excess of air that may be drawn into the housing 11 through the passageways E and D provided by the cooperating horizontal wall portions 16 and 23, and 15 and 22, there is provided a conduit 33 through which excess air is conducted from the conduit 30 to a suitable type of filter or collector 32. After passing through filter elements 34, air from which the dust has been removed is discharged through an exhaust 35. Suction may be applied to the exhaust 35 if necessary. Dust collected in the separator 32 is carried by gravity through a conduit 36, assisted by a certain amount of air or gas flowing therethrough, into the intake chamber 12.

The main supply of treating agents, such as talc, soapstone, or the like, is stored within a reservoir or receptacle 37, provided with a gate valve 38, or other means for regulating the discharge of the treating agent therefrom into a conduit 39 leading into the intake chamber 12. Although the reservoir is shown, for convenience, at a lower level than the chamber 12, it may actually be elevated thereabove in order that the dust may be fed by gravity, or any type of dust feeding mechanism may be employed.

In operating the apparatus just described, the blower 26 is first started up to cause a circulation of air or gas, withdrawn from the housing 11, through the system including the conduit 28, the dust collector 29, and the conduit 30 back to the entrance chamber 12. Dust from the storage receptacle 37 is introduced into the circulating system by proper regulation of the gate valve 38, the dust entering the intake 12 being there picked up by the stream of air entering thereinto through the conduit 30.

The dust laden air passes upwardly through the passageway 17 in the direction of the underside of the traveling web 10. Most of the dust laden air passes completely through the open mesh web 10 into the turning chamber 24, but some small proportion of the dust laden air may flow through the open meshes of the web 10 longitudinally thereof and thus find its way into the exit chamber passageway 18 with entering the turning chamber. The dust laden air flowing into the turning chamber 24 has its direction reversed and passes downwardly in the direction of the arrows into the passageway 18 and thence into the exit chamber 13. From the exit chamber 13, the air is withdrawn under the suction effect of the blower 26 and continues through the cycle just described.

The stream of air passing through the housing 11 is preferably maintained under a pressure slightly less than atmospheric, for the purpose of preventing the escape of dust therefrom into the surrounding atmosphere. Accordingly, there is a slight leakage of air into the system through the entrance passageway E, formed by the flanges 16 and 23, and through the exit passageway D, formed by the flanges 15 and 22. Also, since the web 10 is of open mesh structure, a certain amount of air is pulled into the housing 11 through the web material itself.

In order to remove from the system the excess

of air so drawn in, a portion of the air stream within the conduit 30 is allowed to pass out through the conduit 33 into the collector 32, from which dust is returned to the entrance chamber 12. To lessen the load placed upon the collector 32, a large proportion of the dust is first removed from the air stream by means of the dust collector 29. The dust from the collector 29 also returns through the entrance chamber 12.

Consequently, there is very little loss of dust from the system except that picked up by the traveling web 10, and any loss is replaced by admission of fresh dust from the supply reservoir 37.

Since the dust laden stream of air is passed completely through the traveling web 10, first in one direction and then in the other, a uniform distribution of the dust over the surfaces of the web and throughout the body thereof is insured. The amount of suction produced by the blower 26 can be so regulated as to prevent any substantial excess of dust adhering to the surfaces of the web 10 as it leaves the exit passageway D, since with the higher velocities and lower pressures within the housing 11, any loose dust on the surfaces of the web 10 will tend to be drawn inwardly into the housing, instead of being permitted to remain on the web surfaces as it leaves the housing. There may also be a slight flow of dust laden air longitudinally through the web 10 owing to its great porosity. Consequently, there is complete penetration of the dust laden air stream into all of the interstices of the open mesh web material.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. The method of dusting a batt of porous material, which comprises passing a dust laden gas completely through said material from one side to the other and back again and maintaining said gas during such passage under less than atmospheric pressure.

2. The method of treating a traveling web of open mesh porous material with a finely divided agent, which comprises suspending said finely divided agent in a stream of a gas, passing said laden gas stream back and forth through said traveling web and maintaining said gas stream during such passage back and forth under a pressure slightly lower than atmospheric pressure.

3. The method of treating a traveling web of open mesh porous material with a finely divided agent, which comprises suspending said finely divided agent in a stream of a gas, passing said laden gas stream back and forth through said traveling web, maintaining said gas stream during such passage back and forth under a pressure slightly lower than atmospheric pressure, replacing the amount of said agent taken out of said stream by said traveling web, and bleeding out of said gas stream any excess of gas drawn thereinto due to the subatmospheric pressure.

4. The method of applying talc and the like to a traveling web of rubberized open mesh fibrous material, which comprises suspending finely divided talc in an air stream, directing said talc-laden air stream through said traveling web from opposite directions spaced lengthwise of said web and maintaining said air stream under less than atmospheric pressure while passing through said

web to draw air from the outside into said stream and prevent escape of the talc therefrom into the atmosphere.

5. The method of applying talc and the like to a traveling web of rubberized open mesh fibrous material, which comprises suspending finely divided talc in an air stream, directing said talc-laden air stream through said traveling web from opposite directions spaced lengthwise of said web, separating talc from the air stream after leaving said web and reintroducing such separated talc into said air stream prior to repassage through said web.

6. The method of dusting a traveling web of an open mesh fibrous material, which comprises circulating a stream of air laden with a dusting agent in a substantially closed system, within a part of said system passing said laden air back and forth through a length of said traveling web while under subatmospheric pressure, some outside air being thereby drawn into said system, and bleeding out of said system excess air substantially free from said dusting agent.

7. In a machine of the class described, a housing for enclosing a portion of a traveling web of porous material having an inlet and outlet on the same side of said web and a cover plate on the opposite side spanning said inlet and outlet and having ends spaced from said housing by the thickness of said web, and means for introducing a stream of dust laden gas into said housing inlet for passage through said enclosed web portion and between said cover and web and back through said web for discharge through said

outlet.
8. In a machine of the class described, a housing for enclosing a portion of a traveling web of porous material having an inlet and outlet on the same side of said web and a spaced cover plate on the opposite side spanning said inlet and outlet, means for introducing a stream of dust laden gas into said housing inlet for passage through said enclosed web portion and between said cover and web and back through said web for discharge through said outlet and means for maintaining the stream of gas under subatmospheric pressure during passage through said housing.

9. In a machine for dusting a traveling web of porous fibrous material, a housing substantially enclosing a portion of said web and having an inlet and outlet on the same side thereof, said housing including a cover plate on the other side thereof spanning said inlet and outlet and supported by said housing at a level such as to define an air space between said web and said cover plate, a mixing chamber connected to said inlet and means connected to said outlet for sucking a dust-laden stream of air from said mixing chamber through said housing for passage through a web portion enclosed thereby, through said air space, back through another portion of said web and through said outlet.

10. In a machine for dusting a traveling web of porous fibrous material, a housing substantially enclosing a portion of said web and having an inlet and outlet on the same side thereof, said housing including a cover plate on the other side thereof spanning said inlet and outlet and supported by said housing at a level such as to define an air space between said cover plate and said web, a mixing chamber connected to said inlet, means for sucking a dust-laden stream of air from said mixing chamber through said housing for passage through a web portion enclosed there-

by, through said air space and back through another portion of said web and through said outlet, a separator beyond said suction means and in advance of said mixing chamber for removal of some of said dust prior to the return of the air stream to said mixing chamber, conduit means connecting said sucking means and said outlet, and further conduit means connecting said separator with said sucking means and with said mixing chamber.

11. In a machine for dusting a traveling web of porous fibrous material, a housing substantially enclosing a portion of said web and having an inlet and outlet on the same side thereof, said housing including a cover plate on the other side thereof spanning said inlet and outlet and supported by said housing at a level such as to define an air space between said web and said cover plate, a mixing chamber connected to said inlet, means for sucking a dust-laden stream of air from said mixing chamber through said housing for passage through a web portion enclosed thereby, through said air space, back through another portion of said web and through said outlet, a separator beyond said suction means and in advance of said mixing chamber for removal of some of said dust prior to the return of the air stream to said mixing chamber, conduit means connecting said sucking means and said outlet, further conduit means connecting said separator with said suction means and with said mixing

chamber, and means for bleeding excess air out of the air stream from which dust has been removed prior to the return of the air stream to said mixing chamber.

5 12. The method of dusting a sheet of porous material which comprises establishing a U-shaped stream of dust laden gas and passing said sheet transversely through the legs of said U-shaped gas stream.

10 13. The apparatus for dusting a sheet of porous material which comprises means for establishing a stream of dust laden gas, a U-shaped conduit for said gas stream, and means for passing said sheet transversely through the legs of said U-shaped conduit.

15 14. The method of dusting a sheet of porous material which comprises establishing a U-shaped stream of dust laden gas and passing said sheet transversely through the legs of said U-shaped gas stream at a height such that the blight of said U-shaped gas stream will sweep over the surface of said sheet.

20 15. The apparatus for dusting a sheet of porous material which comprises means for establishing a stream of dust laden gas, a U-shaped conduit for said gas stream, and means for passing said sheet transversely through the legs of said U-shaped conduit at a height such that the gas stream will sweep over the surface of said sheet.

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