July 26, 1966 W. J. WILLHITE 3,262,423

APPARATUS FOR TREATING POROUS WEB MATERIAL

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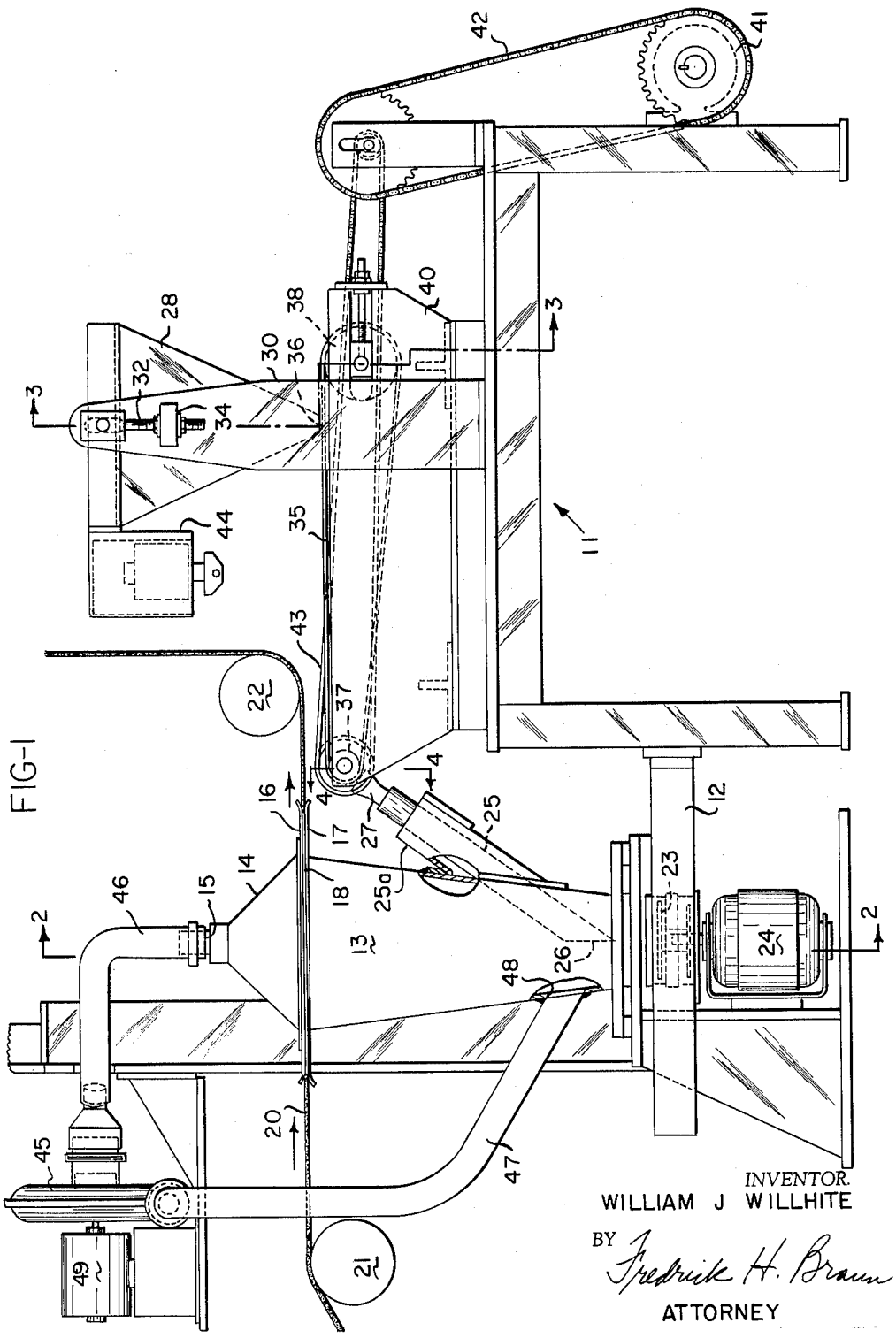


FIG-1

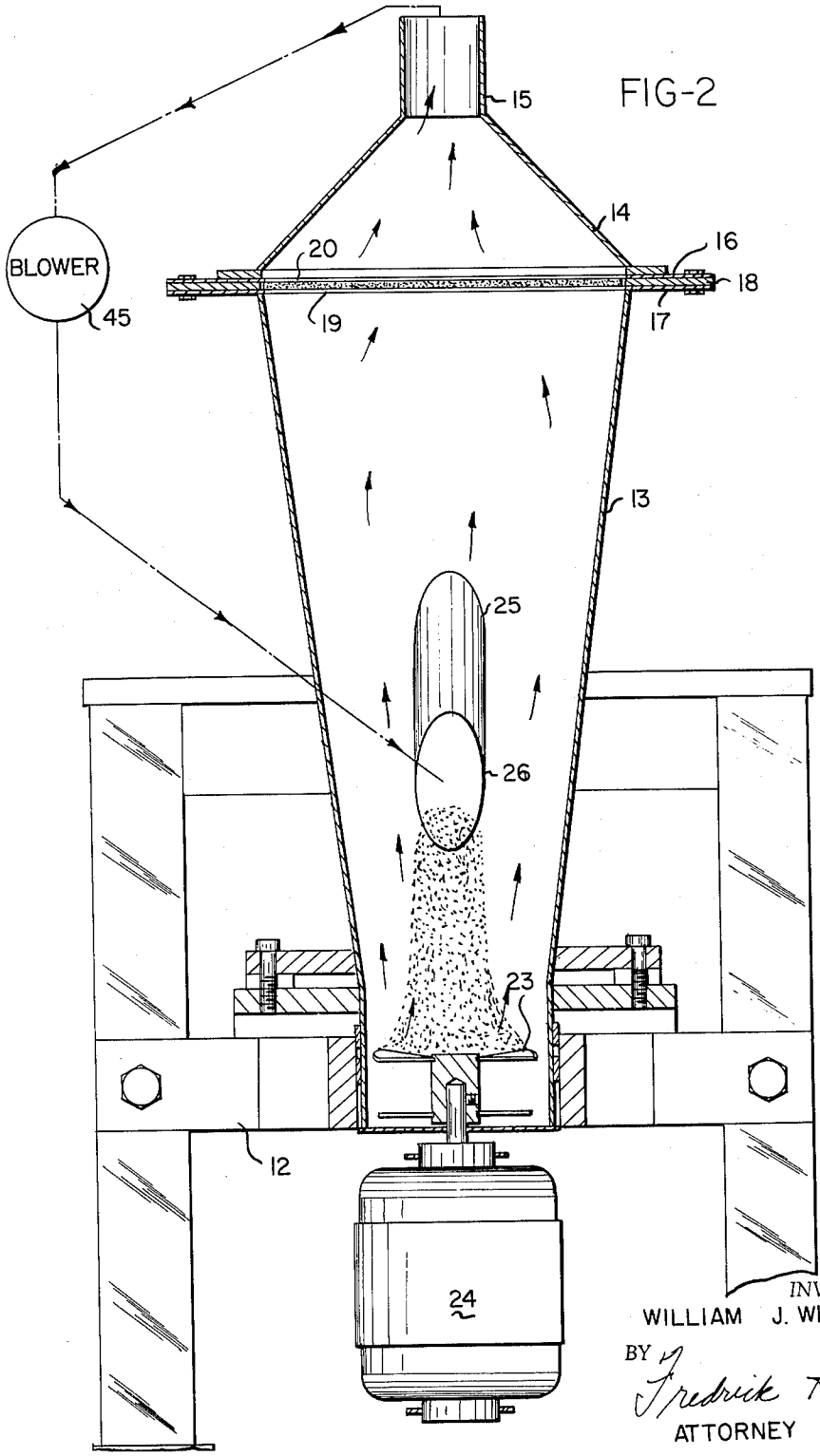
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FIG-2



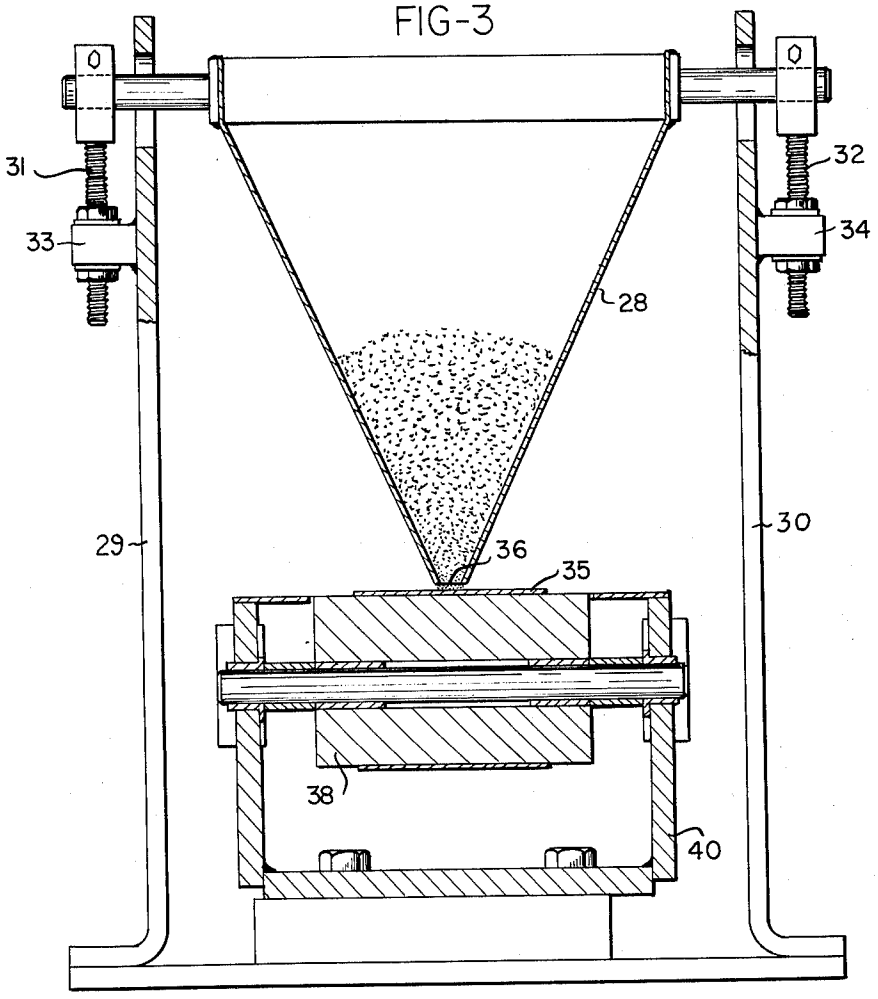
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FIG-3



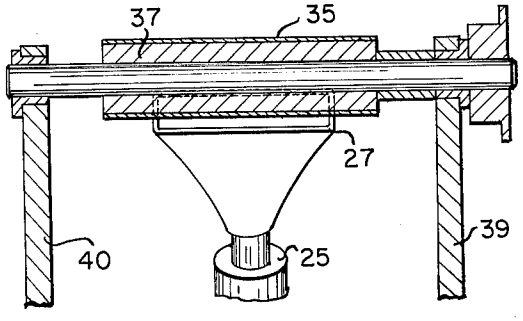


FIG-4

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APPARATUS FOR TREATING POROUS WEB MATERIAL

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2 Claims. (Cl. 118—309)

This invention relates to a web treating apparatus. More particularly, the invention pertains to an apparatus for the deposition of particles in a substantially uniform pattern on a constantly moving web.

In the manufacture of products from web material, e.g. paper and the like, it is sometimes desirable to treat the web with an agent which imparts certain desired properties to the web in the course of its fabrication into a finished product. For example, in the manufacture of disposable diapers of the type described and claimed in U.S. Patent 3,180,335 issued on April 27, 1965, to Robert C. Duncan et al., said patent being commonly owned by the assignee of the present invention, a plurality of layers of creped cellulose wadding are enclosed by a top sheet of paper or a non-woven fabric web. If desired, the top sheet can be treated by depositing thereon a material such as a bacteriostatic agent, e.g. bis(3,5,6-trichloro-2-hydroxyphenyl)methane and related products, or an inert talc material or any other composition or compound which is deposited thereon for the purpose of giving the sheet certain desired properties. The uniform application of such materials to a web moving at high speeds is difficult since the web is necessarily moving at substantial rates to permit the achievement of practical production speeds and in some cases the deposited material is very difficult to handle without creating undesirable atmospheric conditions in the region of the production equipment.

It is an object of the present invention to provide an apparatus for uniformly depositing a material on a continuously moving porous web without interfering with the speed of web movement.

Another object of the invention is the provision of an apparatus of the above character including means for feeding the treating material at substantially constant rates which can be adjusted within certain limits.

The nature and objectives of the invention can be summarized briefly as comprising an apparatus for treating a web of porous material by moving the web through a dispersing chamber containing an atmosphere of suspended particles. The dispersing chamber is fed with the treating material at a substantially constant rate and the treating material is dispersed within the chamber as it enters. The atmosphere of suspended particles within the dispersing chamber is recirculated constantly so that the said atmosphere is continuously moved transversely through the moving web thereby depositing a uniform pattern of the treating material on the web as it is passed through the chamber.

While the specification concludes wtih claims particularly pointing out and distinctly claiming the subject matter regarded as forming the present invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a side elevation of an apparatus that can be employed in the practice of the invention.

FIGURE 2 is an elevation partially in cross section taken on the line 2—2 of FIGURE 1 and illustrates the dispersing chamber.

FIGURE 3 is an elevation partially in cross section taken on the line 3—3 of FIGURE 1 and illustrates the supply hopper and feed belt.

FIGURE 4 is a cross section taken on the line 4—4 of FIGURE 1 and illustrates the feed belt drive pulley and the inlet funnel to the dispersing chamber.

Referring now to the drawings and particularly FIGURES 1 and 2 thereof, the apparatus as illustrated includes a frame 11 having an extension 12 which supports a dispersing chamber 13. The dispersing chamber 13 is provided with a cover 14 having an outlet connection 15. Web guide plates 16 and 17 separated by the spacer 18 are mounted in opposed relation at the junction of chamber 13 and cover 14. The guide plates 16 and 17 define an opening 19 through which a moving web 20 is threaded. The moving web 20 is drawn from a supply roll (not shown) and is supported by the guide rolls 21 and 22 from where it is drawn to a machine for further processing. It will be noted that the width of web 20 is such that it covers substantially the entire cross section at the juncture of the dispersing chamber 13 and the cover member 14.

Mounted in the lower portion of the dispersing chamber 13 is a disperser fan blade 23 which is continuously rotated by the motor 24 suspended beneath the chamber 13. The constant rotation of the fan blade 23 maintains an atmosphere of suspended treating particles within the dispersing chamber 13 for the purpose that will become apparent as the description proceeds.

Means for continuously supplying a web treating material to the dispersing chamber are also provided. For purposes of illustration herein, the treating material will be described as being in the form of a finely divided powder. It will be understood that liquid treating material or suspensions in liquids can be supplied to the dispersing chamber in the form of a finely divided mist or vapor suspended in the atmosphere within the dispersing chamber.

An inlet tube 25 held by the support 25*a* projects through a side wall of the chamber 13 and terminates in an opening 26 which is located over the fan blade 23. This deposits the incoming powdery treating material directly over the fan blade so that it becomes dispersed in the atmosphere of the chamber 13 almost instantaneously after being introduced therein. The opening 26 is fixed and located so that the fan blade 23 cannot blow the atmosphere in the chamber 13 out the inlet tube 25. An inlet funnel 27 is provided at the inlet to the tube 25 so that the powdery treating material can be introduced with relative ease by a device, for example, as illustrated in FIGURE 1.

Mechanism for supplying powdery treating material into the funnel 27 at a substantially constant rate will now be described. This includes an open supply hopper 28 suspended from the hopper support members 29 and 30 as illustrated in FIGURE 3. The hopper 28 is adjustable by means of the studs 31 and 32, which are movable upwardly and/or downwardly in the brackets 33 and 34 as will be understood by those skilled in the art.

An endless feed belt 35 is mounted beneath the opening 36 in the hopper 28 and is driven by the pulley 37 (FIGURE 4). The other end of the feed belt 35 is supported by the idler pulley 38. The pulleys 37 and 38 are supported for rotation in the members 39 and 40. The pulley 37 is driven at substantially constant speed by the motor 41 through the chain drives 42 and 43 as will be understood by those skilled in the art. A solenoid 44 is attached to the hopper 28 for the purpose of creating vibrations which prevent the powdery treating material from bridging or lumping and for otherwise encouraging uniform flow.

A recirculating system is provided for constantly moving the atmosphere of suspended particles within the chamber 13. The recirculating system includes a blower

45 having its inlet connected to the conduit 46 which is attached to the connection 15. The outlet of the blower 45 is returned to the chamber 13 by the conduit 47 entering at 48 in FIGURE 1. The motor 49 is used to constantly drive the blower 45.

In operation, the supply hopper 28 is filled with a powdery treating substance which is uniformly deposited through the opening 36 and carried away by the feed belt 35. As the feed belt 35 rides around the pulley 37, the powdery treating material is deposited in the funnel 27. The distance separating the opening 36 from the belt 35 as well as the constant speed movement of the belt 35 makes the flow of powdery treating material substantially constant. The rate of flow can be adjusted by changing the belt speed and/or by changing the height of the hopper opening 36 over the belt 35 and/or by changing the size of the opening 36.

The treating material deposited in the funnel 27 flows through the tube 25 and enters the chamber 13 where it falls toward the rotating disperser blade 23. The disperser blade 23 maintains a contact atmosphere of suspended particles of treating material within the chamber 13. The concentration of particles in the atmosphere depends upon the rate at which treating material is supplied to the chamber, the rate at which it is recirculated by the blower 45 as well as the speed of the web 20 moving between the web guide plates 16 and 17.

It will be evident that the recirculating blower 45 constantly withdraws the atmosphere of suspended particles from the chamber 13, through the web 20 and the resulting atmosphere passes through conduit 46 and returns through the conduit 47. As a result, the atmosphere of suspended particles is drawn transversely through the moving web 20 which because of its porous nature will retain some of the particles as it is moved through the chamber. The effect of this method of operation is to deposit a uniform pattern of the treating material on the moving web.

While particular embodiments of the invention have been illustrated and described it will be obvious to those skilled in the art that various changes and modifications can be made without departing from the spirit and scope of the invention and it is intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed as new is:

1. Apparatus for treating a moving web of porous material comprising the combination of an enclosed dispersing chamber, a rotating dispersing blade within and at the bottom of said chamber, an open inlet duct including a funnel for feeding treating material into said chamber, said inlet duct including a portion of relatively small cross sectional area extending into said chamber and terminating over the central portion of said dispersing blade so that the incoming treating material enters directly over said blade thereby creating an atmosphere of suspended particles within said chamber, opposed web guide and seal means each extending across the width of the chamber and incorporated in an upper part of a chamber wall at one end of said chamber for guiding a continuously moving web of porous material through said chamber, and offtake means located at the top of the chamber whereby said atmosphere is drawn through the porous material to thereby leave thereon a uniform pattern of treating material.

2. Apparatus as claimed in claim 1 including means for continuously recirculating the atmosphere drawn through the porous material from said offtake means and reintroducing said atmosphere in said chamber below said moving web of porous material.

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