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MAMORU ISHIWATA ET AL

3,503,370

COATING APPARATUS

Filed May 2, 1967

FIG 1

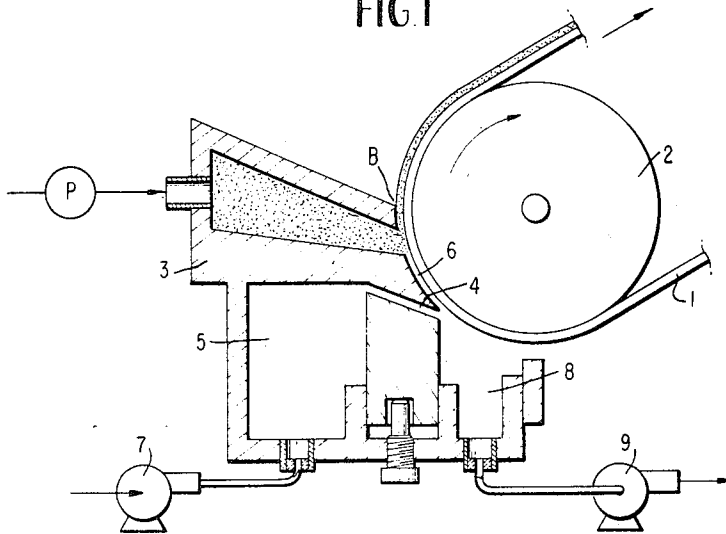
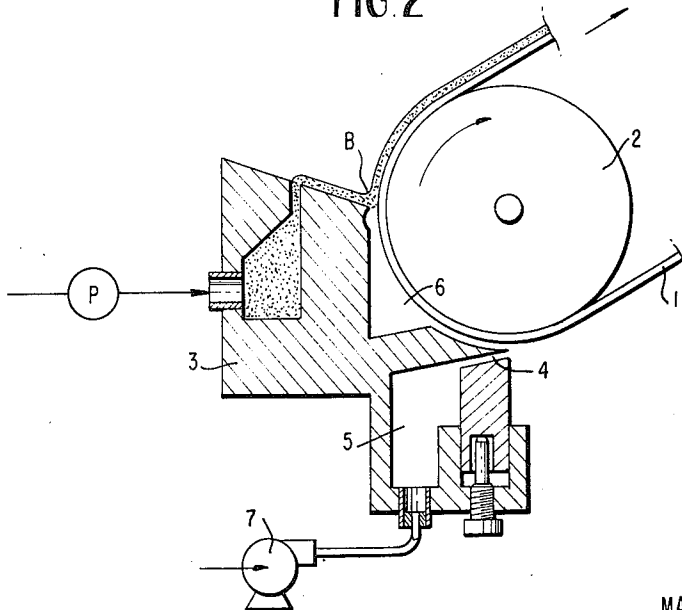


FIG 2



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COATING APPARATUS

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2 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for applying a coating composition on a web by a bridge of the coating composition between a coating applicator and the web, a gas blowing slot is formed at the side of the coating applicator into which the web enters to remove air or dust carried on the surface of the entering support and to provide a reduced pressure space at the back side of the bridge so that the bridge is maintained stable when the coating speed is increased.

This invention relates to an apparatus for applying a coating composition to one side of a continuously moving web.

For applying a coating composition to one side of a continuously moving web it is known to use a slide hopper, an extrusion hopper, a doctor blade, and the like as a coating applicator. When coating of a thin layer at high speed is carried out by one of these known means, a bridge or layer of the coating composition between the coating applicator and the support is broken by the shearing force of the moving support or by an air film carried by the surface of the moving support, and a uniform coating cannot be obtained.

Moreover, with the prior art coating applicators, dust on the surface of the support attracted by electrostatic force are often transferred to the edge of a coating applicator when the support passes through the coating applicator, resulting in undesirable influence upon the coating bridge and the forming of strips in the coating.

For overcoming these difficulties, the invention provides for maintaining a lower pressure on the web inlet side of the coating applicator than on the outlet side to prevent breaking the bridge due to the air film carried on the surface of the support. Otherwise breaking of the coating bridge cannot be adequately prevented when the support is travelling at high speed. The negative pressure on the inlet side of the applicator also eliminates the dust problem.

The coating apparatus of the present invention will now be illustrated in the accompanying drawing, in which FIG. 1 and FIG. 2 are schematic side sectional elevation views illustrating two embodiments of this invention.

Referring to the drawing, a web 1 to be coated moves continuously, around a back-up roller 2, facing a coating applicator 3 such as a slide hopper (FIG. 2) or an extrusion hopper (FIG. 1).

A slot 4 is formed adjacent to a reduced pressure space 6 and is connected to a compressed gas chamber 5 for blowing a gas jet tangential to the web on roller 2 and opposite the direction of movement of the web. The clear-

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ance of the slot 4 may be controlled if necessary. Reduced pressure space or chamber 6 is provided at the entrance of the web to the coating applicator and behind the coating bridge B. A blower 7 is connected to the compressed gas chamber 5 for supplying a gas of a volume and pressure necessary to provide a gas jet from slot 4. In FIG. 1 a gas exhausting means 9 having a capacity corresponding to the jet gas is connected to a suction chamber 8.

In operation, if the clearance of slot 4 and the pressure of compressed gas chamber 5 are selected so that the speed of the gas jet at the outlet of the gas blowing slot 4 may be maintained at a desired value (preferably to 0.5–1.0 mm. in clearance and more than 200 mm. water gauge in pressure respectively), the air film carried by the travelling support is removed by the gas jet from slot 4 and dust adhered to the surface of the support is also removed by the gas jet. At the same time, the pressure of space 6 is maintained at a suitable reduced value by the aspiration action of the gas jet, whereby the bridge B of the coating composition can be stabilized and the coating can be uniformly accomplished.

The gas generally used is air, although an inert gas, steam, solvent vapor or gas containing a small amount of surface active agent may be used, if necessary. A surface active agent may be contained in the gas, in which case air on the surface of the web is replaced with the gas and the temperature and physico-chemical properties of the web are changed so that the web surface may be endowed with antistatic property and the adhesion of the coating composition to the web is enhanced.

As evident from the foregoing, this invention provides an improved coating apparatus in which coating of a thin layer can be carried out at a high speed, the problems due to dust adhered to the surface of the web can be overcome, the adhesive force of a coating composition to the support can be enhanced and the coating bridge thereof between the support and device can be maintained stable to accomplish rapid and uniform coating.

Further, the gas blowing slot is positioned adjacent the coating applicator at the web entrance side so that the gas jet is substantially tangential to the surface of the travelling support.

When coating is conducted by using the improved coating apparatus of the present invention, the following advantages are obtained.

Dust carried on a travelling support or web is removed by the high speed gas jet blown from the gas blowing slot and at the same time the back side of the bridge of a coating composition formed between a coating device and the travelling support is maintained at a lower pressure, which enables the uniform and stable coating of a thin layer with a high speed that has never been attained by a conventional means.

What is claimed is:

1. A coating apparatus for coating by forming a bridge of a coating composition between a coating applicator and a traveling web, the bridge having a back side behind the bridge relative to the direction of movement of the traveling web, with improvement comprising: a gas exit slot in the applicator opening in a direction to direct a jet of high pressure gas opposite the direction travel of the web and to direct the high pressure jet of gas flush with at least a portion of the surface of the web, means for

applying gas under high pressure to the slot, and means providing a space between the applicator and the web in fluid communication with the back side of the bridge of the coating composition and adjacent to the gas jet existing from the slot so that gas from the high pressure gas jet creates a venturi affect through the space to provide a negative pressure at the back side of the bridge at the same time the gas jet being directed opposite the direction of travel of the web and flush with at least a portion of the surface of the web removes dust from the surface of the web.

2. A coating apparatus for coating by forming a bridge of a coating composition as claimed in claim 1 wherein the slot is adjustable.

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