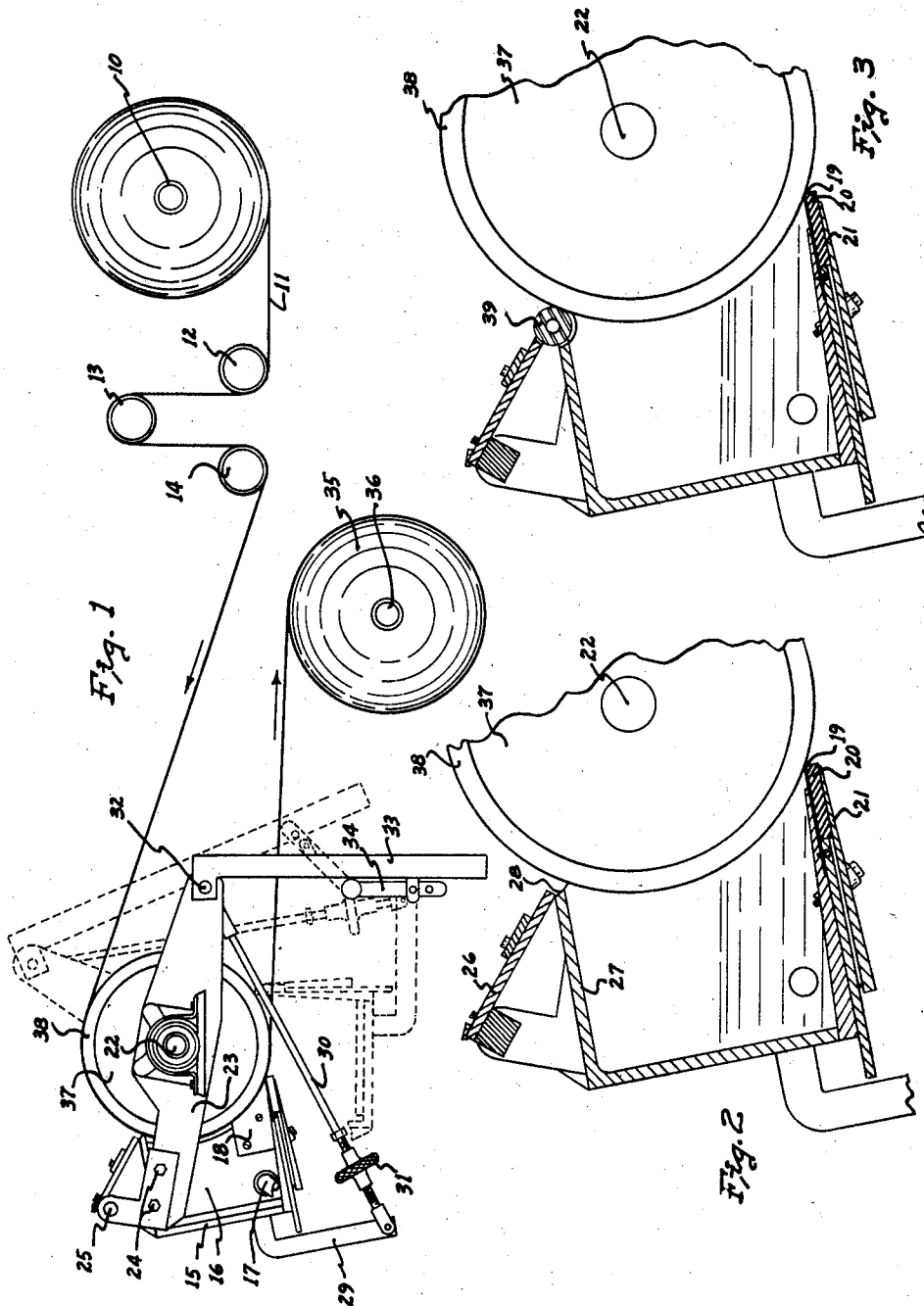


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COATING APPARATUS
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COATING APPARATUS

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This invention relates to coating machines and more particularly to apparatuses for coating a web with a thin film of liquid.

The primary object of the invention is to generally improve coating machines. A more particular object resides in the provision of a coating apparatus adapted to apply to a traveling web of paper of the desired weight or quality, a film of liquid, especially a viscous liquid, said film being exceedingly uniform.

The coating applied to the traveling paper web may have a thickness, for example, several ten-thousandths of an inch. It is fairly well recognized in the printing art that clearer and better printing with minimum ink consumption can be accomplished on certain types of paper if the surface of that paper is coated, that can be accomplished on paper with a natural fiber surface. Knowledge of this fact and the increasing demands of today for better and clearer printing has resulted in a progressively increasing demand for surface coated paper of varying types.

Different kinds of paper require different types and weights of coating. The various commercial book papers require coatings of widely varying weight applied to both sides of the sheet. In contrast wall paper, for example, generally requires a relatively heavy coating applied to one side of the sheet. One principle is clear, however, if the coating is to provide a commercially satisfactory product, it must be evenly and uniformly applied to the sheet, and it must be free from streaks, bubbles, or other disfigurements.

Another object of the invention resides in the provision of an improved fountain or coating device for applying the liquid to the web. The thick liquid here dealt with presents special difficulty, particularly so because the solvents employed are of a highly volatile nature, and the liquid dries almost simultaneously on exposure to air.

In accordance with the present invention, the apparatus is provided with a substantially closed fountain which is open at the roll side. The web of paper is fed through the fountain, thus practically sealing the same. The liquid may be pumped into the fountain and is preferably continuously circulated. The rate of supply is so regulated as to keep the liquid in the fountain at a desired level.

Other objects concerning the fountain are to make it possible to vary the width of the coating being applied to the web; to swing the fountain so that coating material is not lost whenever the machine is stopped or in the event the web should break to prevent loss of the coating material.

Still another object of the invention relates to a doctor for regulating the film thickness. For my purposes the doctor must be a precision instrument as it cooperates with a roll which is smooth and true. The edge of the doctor must mate with the roll very accurately as we are generally dealing with a film which may itself be only several ten-thousandths of an inch in thickness. Because the web may have imperfections and lumps therein it is essential that the doctor be readily yieldable to pass any bump or the like reaching the same. Unless the doctor and/or the roll covering yields freely, the paper web will be torn at such surface irregularities.

As will hereinafter appear, the apparatus and method of the present invention constitutes a simple, easily operated, inexpensive means for obtaining smooth continuous coatings of any desired thickness on any of the commercial types of paper. Moreover, by virtue of the novel apparatus and method of the invention, the coating produced thereby is smoother and more uniformly distributed than in the coatings of the prior art methods. These and other objects of the invention and its numerous and important advantages over the methods and apparatus of the prior art will be made more apparent by reference to the accompanying drawing and the following description of certain preferred embodiments of the invention. Referring to the drawing:

Figure 1 is a schematic diagram explanatory of the coating process and preferred apparatus for practicing the same.

Figure 2 is a fragmentary sectional view showing the apparatus arranged for the application of coating material to a web.

Figure 3 is a view similar to Figure 2 showing a modified form of the apparatus.

The particular apparatus here described is intended to apply a coating to one side of the web but it is to be understood that successive coatings may be applied to the same side of the web and/or to opposite sides of the web by the use of two or more fountains. The precise nature of the coating need not be gone into for the present purpose, other than to state that an oil phase emulsion coating material has been found to work exceedingly well with the apparatus shown.

Referring to the drawing a web 11, in this case paper, is drawn from a paper supply roll 10. The web may be of any commercial known grade. The paper passes around rolls 12, 13 and 14, the roller 13 being counter balanced or resiliently urged upwardly in order to apply a desired ten-

sion to the web. Such an arrangement is often employed just before the web is reeled on the take-up rolls 36.

The speed of the web being coated may vary over a wide range but with an oil emulsion coating speeds upward of one thousand feet per minute may successfully be employed. The web 11 passes over a roll 37 on which it is preferred a resilient surface be employed. Liquid for coating unit is stored in a suitable tank (not shown) and is circulated to and through the fountain. The fountain includes a back 15 adjustable sides or dykes 16 so that the width of the coating can be controlled. The coating material is preferably fed to and circulated through the fountain through conduit 17. Secured to the sides and positioned with the forward edge spaced adjacent to the paper to be coated are seals 18 which may be made of rubber.

To the sloped bottom of the fountain at the forward edge is secured doctor blade 19. The doctor blade 19 can be adjusted to allow for different thickness of paper to be coated as well as the thickness of the coating to be applied as the doctor blade must be relatively thin and non-uniform flexing of the blade might result in an uneven coating being applied. To obtain a uniform flexing of the blade an elastic blanket of substantial width is placed under the blade. To support the elastic blanket 20 which may be of sponge rubber a rigid member 21 is placed under the blanket.

Mounted on a suitable shaft 22 is roll 37 which preferably has an elastic cover 38 thereon. The paper to be coated passes over the roll and is carried through the fountain which applies the coating material to the web. The fountain top 27 supports upper plate which has adjustably secured thereto air seal member 28. The air must be excluded from being whipped into the coating material in the fountain by the web of paper being passed therethrough.

In event a break of the web occurs during coating operation or for any reason the feeding of the web is stopped, the fountain is so constructed that it may be moved to the inactive position shown by dotted lines in Figure 1. Mounted on shaft 22 is member 23 which is secured at 24 to plate or hanger member which is hingedly fastened to the fountain. To the back 15 of the fountain is secured angle member 29 which has hingedly fastened rod 30 which can be adjusted as to length by means of member 31. The rod 30 and member 33 are hingedly secured to member 23 at 32. Near the lower end of member 33 is secured member 34.

The paper passes through the fountain and between the doctor blade capable of being flexed and flexible surfaced roll 37. If more than one coating is desired on the same side of the web then the web passes through a coating apparatus substantially identical with the one just described. It is to be understood that if both sides of the web are to be coated the web in its travel has applied to the side opposite the first coat, coating material by an apparatus similar to the one above described.

The web after being coated may be passed through a dryer (not shown) if the coating material employed is of such nature as to require such treatment but certain coating material which has been successfully used with this coating apparatus requires no drying equipment before being reeled on a roll such as 36. The roll of mate-

rial such as paper 35 then is ready for use or other treatment.

In Figure 3 is shown a modified form of coating apparatus in which the upper air seal 28 is replaced by contact roll 39 which acts as a seal and at the same time applies pressure to the web passing between the surfaces of rolls 39 and 37.

Briefly the process of coating material such as a web of paper consist: of advancing the web over roll 37 preferably having a resilient surface, through the fountain containing the coating material; the resilient doctor blade in cooperation with the resilient surface roll 37 controls the application of a coat to the traveling web. The coated web with or without other treatment is then reeled on roll and is then ready for shipment.

It is to be understood that changes and modification may be made which falls within the spirit of the present invention and within the scope of the appended claims.

What I claim is:

1. An apparatus for applying coating material to a web of paper or analogous material comprising a fountain having a top, back, sides, bottom and an open front; a roll having a resilient cover, said open front being directed toward the roll so that the fountain and the roll form an applying chamber, an air seal means secured to the fountain top adjacent to the roll and at a selected distance therefrom, a doctor blade secured to the fountain bottom at a selected distance from said roll, and a resilient pad mounted against lower side of the doctor blade.

2. An apparatus for applying liquid coating to a web of paper or analogous material comprising a shaft, a roll on said shaft, a fountain supported on said shaft in juxtaposition to said roll, a doctor blade secured to said fountain at a selected distance from the roll, a rubber member mounted against lower side of the doctor blade and a rigid member secured to the fountain for holding the rubber member against the doctor blade.

3. An apparatus for applying liquid coating to a web comprising a resilient surfaced roll, a fountain having an open side, said open side directed toward the roll so that the roll and fountain form an applying chamber, a thin yieldable doctor blade mounted along an edge of the open side of the fountain and held at a selected distance from the roll, a resilient member against lower side of the doctor blade, and a rigid member secured to the fountain for supporting the resilient member against the doctor blade.

4. An apparatus particularly intended for coating a continuous web of paper or analogous material comprising means for defining the walls of a fountain, means for imparting translatory motion to a web including a roll having a resilient cover upon which the web is carried, said roll mounted in juxtaposition to the fountain, a doctor blade mounted on the fountain for controlling the amount of coating material applied to the web carried by the roll, and a resilient pad mounted against lower side of the doctor blade to provide uniform flexing of the blade.

5. An apparatus for applying coating material to a web of paper or analogous material, comprising a roll upon which the web is carried, a fountain having an open side, said open side being directed toward the roll so that the roll and fountain form an applying chamber, doctoring means mounted on said fountain along one edge of the open side, said doctoring means held at a selected distance from the said roll, and a resil-

ient member held against lower side of the doctoring means whereby uniform flexing of the doctoring means is obtained.

6. An apparatus for applying coating to a web of paper or analogous material comprising a shaft, a roll mounted on said shaft, a fountain carried by said shaft and having an open side directed toward the roll, said roll and fountain forming an applying chamber, a doctor member secured to the fountain along an edge of the open side and held at a selected distance from the roll for controlling amount of coating applied to the web, a resilient member positioned against lower side of the doctoring means, means for holding the resilient member against the doctoring means, and members hingedly connected to the fountain and to each other whereby the fountain can be swung to a non-coating position without loss of coating material.

7. In a coating apparatus including a fountain

having a bottom, a relative thin doctor blade secured to the fountain bottom, a resilient pad secured against lower side of the doctor blade, and a roll in juxtaposition to the fountain; said doctor blade secured at a selected distance from the roll.

8. An apparatus for coating a continuous web of paper or analogous material comprising, a web carrying roll; a fountain having an open side directed toward the web carrying roll so that the fountain and the said roll forms a coating material compartment; an air seal roll cooperating with one of the edges of the open side of the fountain and the web carrying roll, said air seal roll adapted to contact a web on the web carrying roll; and a doctor blade secured to an edge of the open side of the fountain and held at a selected distance from the web carrying roll for controlling amount of coating material applied to the web.

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