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J. D. MURRAY

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COATING OF PAPER

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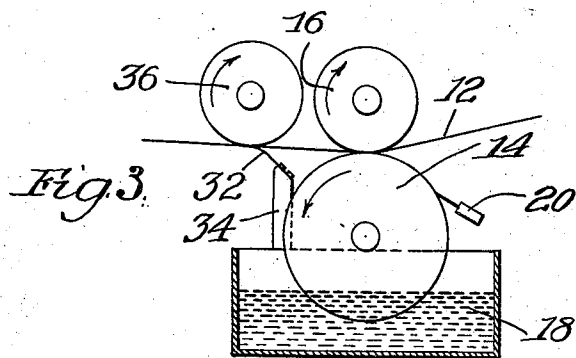
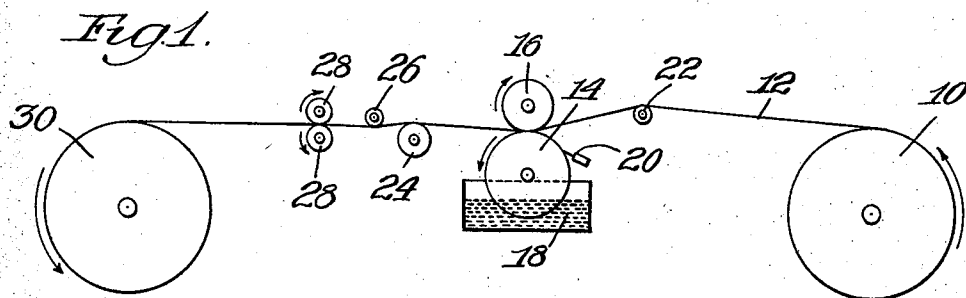
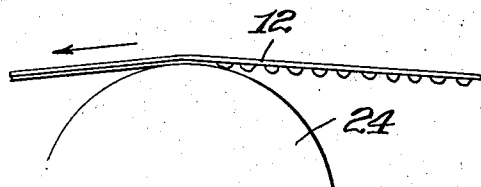


Fig. 2.



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UNITED STATES PATENT OFFICE

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COATING OF PAPER

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Application September 22, 1938, Serial No. 231,102

1 Claim. (Cl. 91—33)

This invention relates to the coating of paper, particularly with a moisture-proof and/or grease-resistant glossy film, and is described below in connection with providing the surface of the paper with a moisture-proof coating in the form of a flexible durable film superposed on the surface of the paper but which does not penetrate substantially into the structure of the paper.

An object is to provide a coating of uniform thickness and of coating material which is durable and flexible as well as transparent, which does not extend substantially into the structure of the paper and therefore does not cause the "bleeding" of inks on the paper. This also permits the use of a minimum amount of material for a coating of given thickness.

The above and other objects and features of the invention will be described in connection with the apparatus illustrated in the accompanying drawing, in which:

Figure 1 is a diagrammatic representation of an apparatus for coating paper according to one phase of my invention;

Figure 2 is a diagram on a larger scale of the smoothing out of the coating material into a film; and

Figure 3 is a partial diagram of a modified coating and smoothing device which can be used in the apparatus of Figure 1.

The illustrated apparatus is intended for use in applying to paper a thermoplastic transparent coating in a flexible film adhering to the surface of the paper without substantially penetrating its structure. The coating is applied hot, and chilled or cooled rapidly to cause it to set before crystallization takes place and before the coating material has time to sink into the paper much below the surface. Various coating materials can be used, some of which are described in my prior applications Nos. 47,004, filed October 28, 1935, and 153,922, filed July 16, 1937. One type of such materials consists of a mixture of the soaps of certain heavy metals, with resin and wax, an example being: 18½ parts magnesium stearate, 36½ parts zinc stearate, 25 parts resin, 10 parts of the zinc soap of Japan wax, and 10 parts of paraffine wax.

Figure 1 illustrates a web-coating apparatus including a supply roll 10 of paper, from which a web 12 is led over a novel coating roll 14, against which it is held by a rubber-faced presser roll 16. The coating roll 14 has its lower part turning in a bath 18 (heated in any desired manner) of the coating material.

The coating roll 14 is of metal, and has etched or engraved or otherwise formed in its surface intaglio recesses such as dots or lines which are closely spaced and arranged in any suitable pattern which distributes them uniformly over the surface of the roll. The coating material fills these recesses with an accurately predetermined amount of the coating material, the excess being removed from the periphery of the coating roll by a doctor knife or other scraper 20. One or more guide rolls 22 may be provided as needed. The roll 14 may be heated.

This transfers to the lower surface of the paper an accurately predetermined amount of hot plastic coating material arranged in a pattern of closely spaced dots or lines. This is smoothed out as illustrated in Figure 2 into a continuous uniform film by the pressure and polishing or wiping action of a heated polishing roll 24 against which the paper web is held by an adjustable guide roll 26, the roll 24 usually being driven faster or slower than (or in the reverse direction from) the corresponding motion of the paper. If driven at the same speed, somewhat greater pressure against the paper is needed.

Before the coating material, now in a uniform film, has time to crystallize or to sink substantially into the structure of the paper, it is chilled by draw rolls 28, from which the coated paper web passes to a rewind roll 30. In some cases the rolls 28 will not require special cooling means to chill the coating, but if necessary they may be cooled by circulating cold water or brine through them, or by an air blast; I prefer however to use water-cooled chilling rolls which may if desired be separate from the drawing rolls and placed ahead of the drawing rolls. The ingredients of the coating material are present in the final film in solid solution, thereby obviating possible impairment of transparency due to partial crystallization.

Figure 3 illustrates a modified structure similar to that of Figure 1 and in which parts corresponding to similar parts in Figure 1 are indicated by the same reference numerals. In this apparatus the smoothing roll of Figure 1 is replaced by a thin flexible spring-steel blade 32 mounted at one edge on a bracket 34 closely adjacent the roll 14. The blade 32 is preferably set at an angle of about 45° to the plane of the paper and is bent over by pressure of the paper, backed up by a contact roll 36 or the like, against it so as to be in contact with the coated surface

of the paper for a distance of about one half inch or more. Preferably the blade 32 is heated by suitable heating means in the bracket 34.

The operation of the blade 32 is substantially similar to that of the polishing roll 24 of Figure 1 but provides a much simpler construction. I have found that a blade of about .003" to be highly satisfactory but the thickness is preferably greater for higher paper speeds and less for lower speeds.

While two forms of apparatus have been described, it is not my intention to limit the scope of the invention to those particular apparatuses, or otherwise than by the terms of the appended claim.

I claim:

Apparatus for coating a sheet surface or the like comprising a heated bath of thermoplastic coating material, a rotatable deposit roll dipping into said bath and having its periphery formed with a plurality of closely adjacent recesses of known capacity for picking up material from said bath, a doctor blade wiping said roll periphery so as to leave a measured quantity of material on said periphery, a heated smoothing member contacting said deposited coating under pressure, said heated member comprising a springy flexible blade, and a rotatable roller backing the uncoated surface of said sheet.

15

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