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C. G. BRIGHT

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METHOD OF MAKING WASHABLE PAPER

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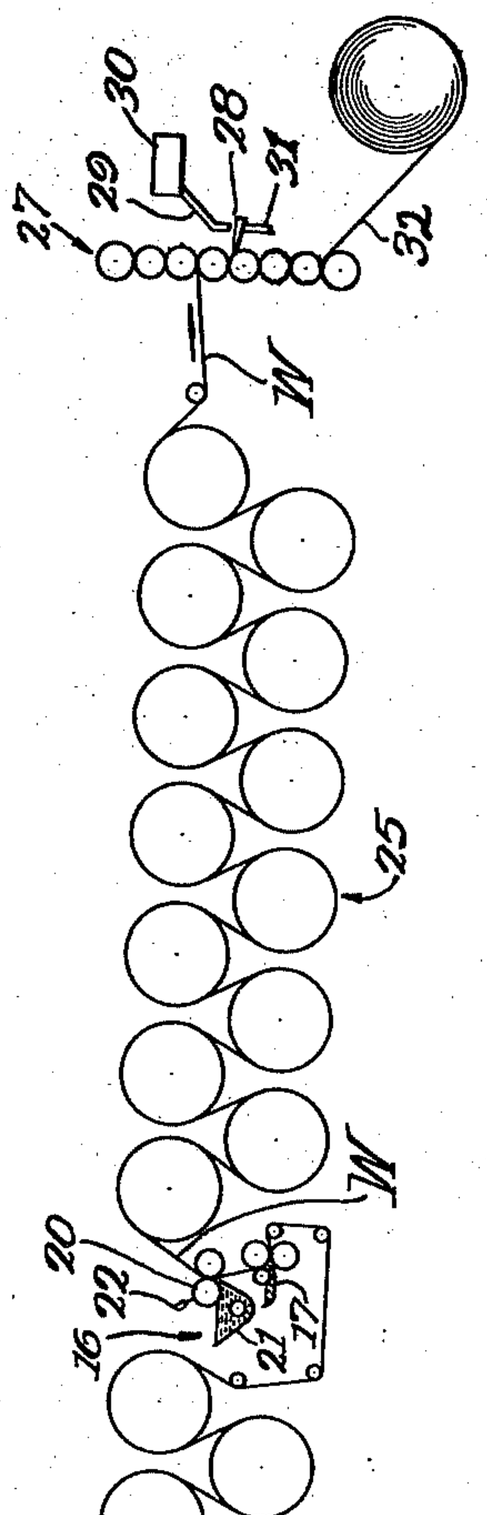

Fig. 1

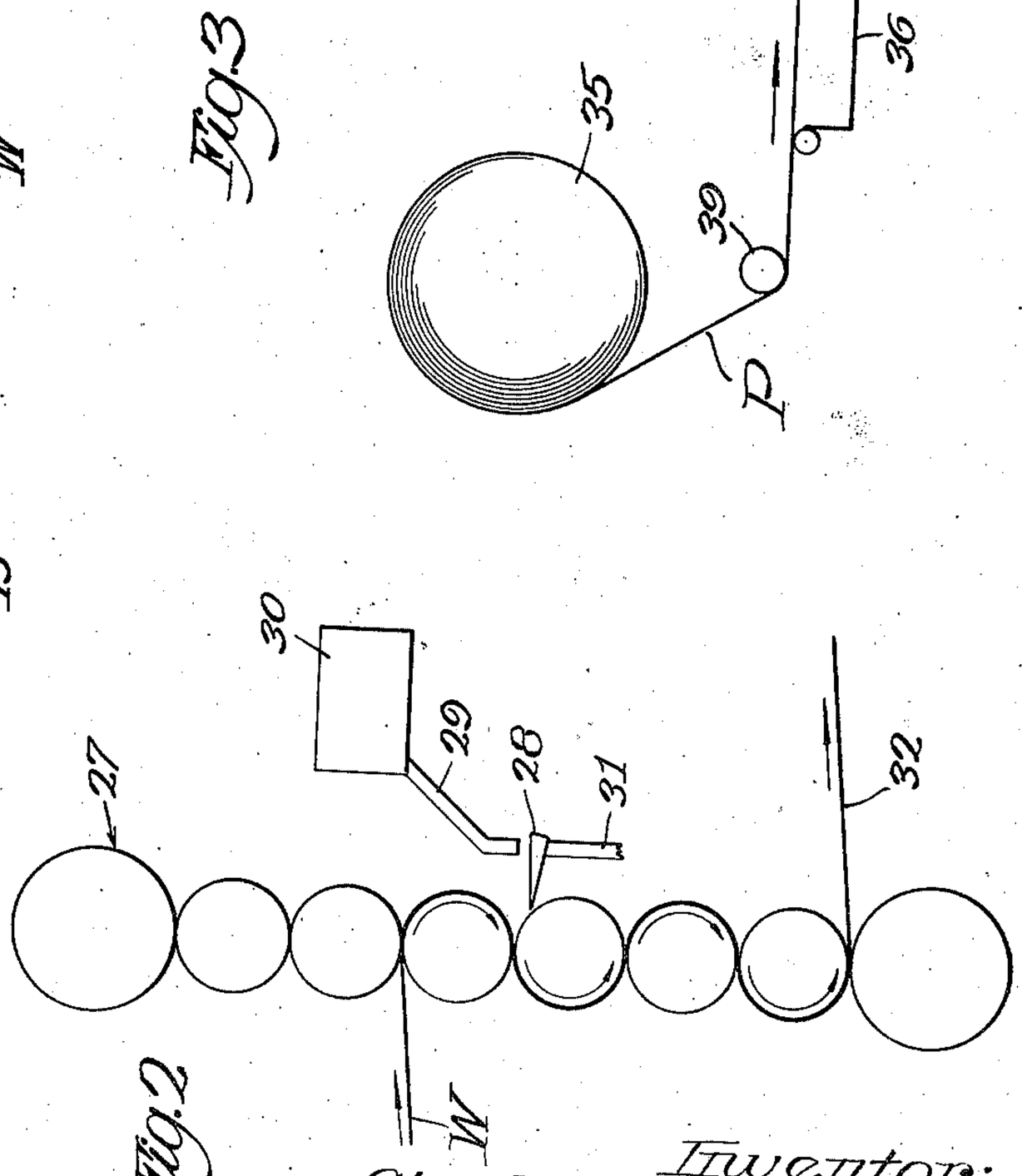

Fig. 2

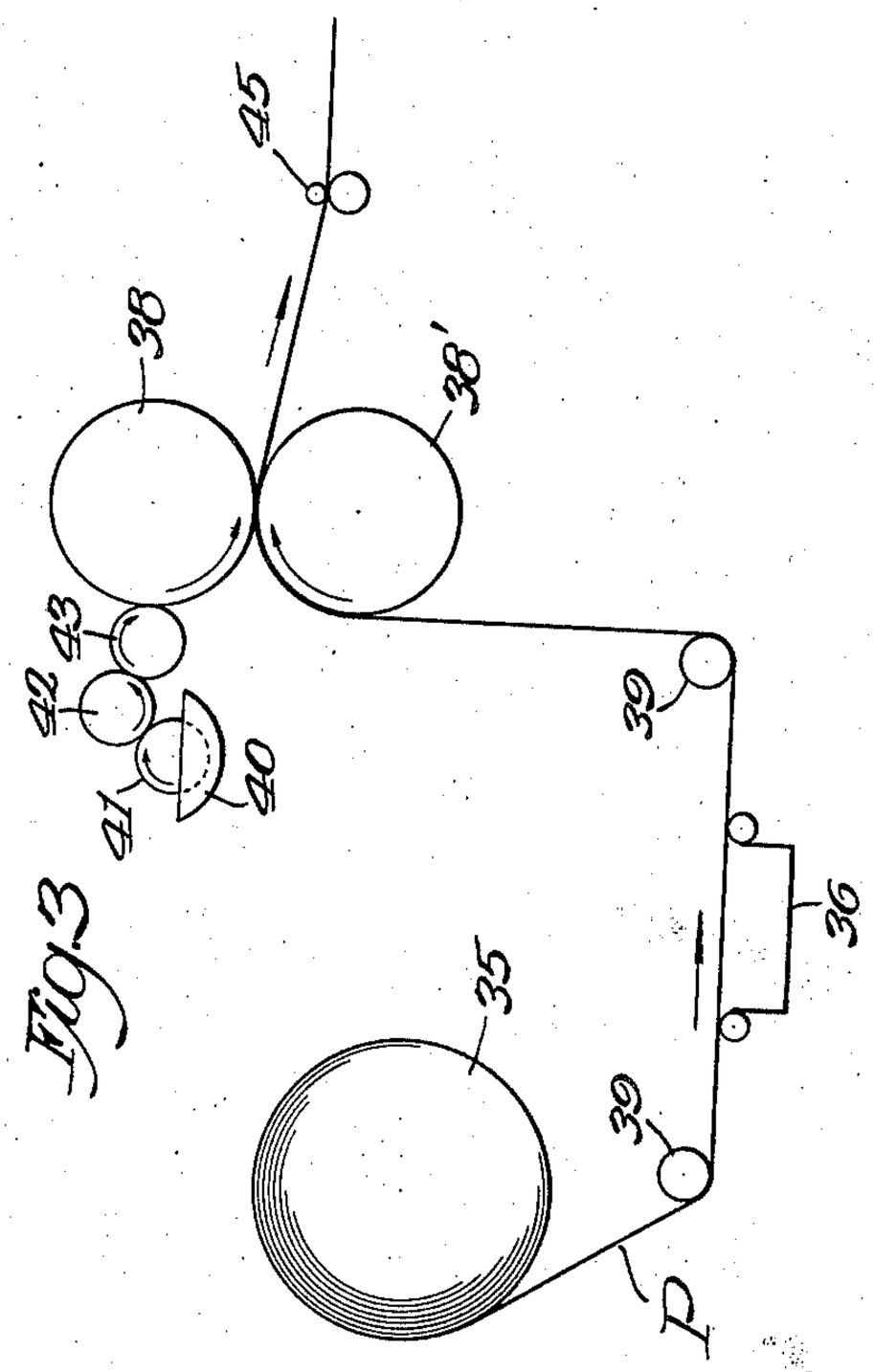

Fig. 3

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2,123,399

METHOD OF MAKING WASHABLE PAPER

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Application May 2, 1935, Serial No. 19,424

4 Claims. (Cl. 92—40)

Said invention relates to a waterproof paper and in its preferred embodiments contemplates an improved paper which is especially suitable for use as a decorative wall covering. Paper embodying said invention, in addition to having high resistance to ordinary washing with water and soap, is highly decorative and is preferably printed with one or more colors and embossed to present a pleasing design to the eye.

In accordance with said invention, the process of manufacturing coated and decorated paper of the type under consideration is considerably shortened and simplified, resulting in substantial saving of time, space and equipment, and the cost is correspondingly reduced.

The base of said improved paper which has a water-resistant surface may be printed upon with inks which are water-insoluble, i. e., in which the solvent or liquid vehicle is other than water, e. g., oil inks, so that the finished surface is washable. The ink, in the preferred method of practicing said invention, is printed at the bottom of depressions in the embossing and it is thus possible to wind up the printed and embossed paper without providing special means for drying the ink. The ink is permitted to dry in the roll and there is thus effected a great saving of equipment and space, such as are ordinarily used for drying paper of this type.

In accordance with one mode of practicing said invention, a very thin, translucent coating may be applied, so that colored designs or decorative effects previously applied to the paper base are not materially impaired or obscured. Also, such a coating tends to soften the design and, hence, enhances the attractive appearance of the product.

According to another method, the coating may contain an opaque filler of the proper color.

Various other features and advantages will become apparent as the description proceeds.

The accompanying drawing which forms part of this specification illustrates diagrammatically one preferred arrangement of apparatus for producing paper in accordance with said invention.

The paper is made on a Fourdrinier machine. It may be coated by the sieve-cloth method after partial drying or by any other suitable process or apparatus, for example, as shown in Bright Patent 1,964,312, granted June 26, 1934. The paper may carry a blend and color-drops, applied, for example, by the process and apparatus disclosed in United States Patent No. 1,595,207.

Where a thin and translucent coating is desired, as, for example, where color-drops or blend have been applied, the base coating material may be prepared as follows:

Two hundred pounds of casein are soaked at 90° F. in 800 pounds of water containing 30 pounds of borax. The mixture is heated to 125° F. and held at this temperature for 20 to 25 minutes. One hundred sixty pounds of mica are mixed with 600 pounds of water, and the casein and mica solutions are mixed. Three pints of sulphonated pine oil and three pints of pine oil are added to the above, which is then diluted with water to 1,900 pounds. It will be understood, of course, that the formula may be varied considerably, and various other potentially water-insoluble materials may be used in lieu of casein, such as glue, vegetable protein, etc. Also, other fillers than mica may be used, as would be apparent to one skilled in the art.

Where an opaque coating is desired, the base coating material may contain a suitable percentage of opaque mineral, such as clay, or blanc fixe.

In the coating bath, whether translucent or opaque, one may include a setting agent for protein, such as formaldehyde, if desired. However, it is preferred to apply the setting agent, such as alum or formaldehyde, on the paper machine or before the paper is wound up, for example, at the calender stacks, as will be described below.

Even though the fixing agent, in my preferred practice is applied as a separate operation, it may be desirable to add a portion to the coating mixture itself.

Referring now to the drawing forming part of this specification and illustrating diagrammatically apparatus which may be used in practicing said invention:—

Figure 1 is a diagrammatic elevation, partly in section, of paper-making apparatus which may be used in practicing said process;

Figure 2 is an enlarged detail elevation showing a calender stack and mechanism associated therewith for applying a fixing solution to a paper web as it passes through said stack, and

Figure 3 is an enlarged detail elevation of mechanism for simultaneously embossing and printing paper in accordance with said invention.

Referring first to Figure 1, the numeral 10 represents a Fourdrinier wire, which may be of standard construction, having a head box 11. If desired, color drops may be applied at any suitable point in the travel of the wire, as at A, and blend may be applied as at B, it being understood that the term "blend" as used here applies to flocculated pulp suspended in low con-

centration in water and applied to paper for imparting a cloudy or other desired ornamental effect. The numeral 12 indicates suction boxes.

From the paper machine the paper web, indicated by the character W, is drawn over drying cylinders, indicated generally by the numeral 15, whence it is conveyed to a coating device indicated at 16. This device may comprise a pan 17 containing a suitable coating material in fluid condition. Examples of suitable coating materials are given above. After application of the coating from the pan 17 by the coating rolls associated therewith, the web is subjected to a smoothing roll 20 associated with a trough 21 carrying a fluid similar to that carried by the pan 17. As explained in said Bright Patent No. 1,964,312, the smoothing roll 20 preferably rotates in a direction opposite to the web W, the latter moving from left to right in Figure 1, and has associated therewith a doctor 22. It is believed that the other elements of the coating mechanism, such as the various rolls in Figure 1 and their functions will be readily apparent from the description shown in said Bright Patent 1,964,312.

The web W, after being coated, is conducted over additional driers, indicated generally at 25, and thence passes to the calender stack represented at 27 and shown on an enlarged scale in Figure 2. Associated with the stack is a doctor 28 for applying to the web a solution for fixing the potentially water-resistant binder which has previously been applied to the web, e. g., formalin. Said solution may be fed as by means of a conduit 29 from a receptacle 30 and the excess may be withdrawn as by means of conduit 31. The web may be conveyed from the stack, as at 32, to reels. There the fixing solution is permitted to react with the coagulable material to render the coating water resistant.

Referring to Figure 3, the numeral 35 represents a reel of paper which has been coated and the coating insolubilized, as indicated above. The paper web P from said roll is conveyed over a pan 36 containing steam for softening the sheet, and it is then conveyed between printing and embossing rolls 38 and 38', suitable guide rolls 39 being provided. The roll 38 may be considered a male roll and 38' a female roll, one of the rolls being preferably of steel and bearing a suitable ornamental design on its surface. Ink and pigment are disposed in a pan 40 from which it is picked up by means of a roll 41, which may be of copper, and thence conveyed by means of leveling rollers 42 and 43 to the embossing roll 38.

After the web P has passed between the rolls 38 and 38' where it is simultaneously printed and embossed, the web is drawn as by the pull rollers 45 to a suitable reeling machine.

By means of the device shown in Figure 3 and more particularly the rolls 38 and 38', ink is applied to the bottoms of the depressions formed by the embossing. It is thus possible to reel the paper immediately after it is printed and embossed, without any special device or space for drying. Since the ink is at the bottom of the depressions, the paper may be reeled while the ink is wet without any danger of smearing, and drying of the ink may take place in the rolls. It will be apparent to one skilled in the art that there is thus effected a great saving in plant space as well as in equipment, resulting in considerable economy.

The ink is preferably of an oil type, so that the sheet is completely water-resistant and washable. The ink may be of a wide variety of formulas. For example, it may contain, besides pigment, a binder, such as rosin, latex, etc., and a fluid carrier, such as "oleum-spirits", a petroleum distillate between naphtha and kerosene.

Various other modifications and variations coming within the spirit of said invention will no doubt suggest themselves to those skilled in the art. Hence, the scope of this invention is not to be restricted to the embodiments herein disclosed or to the specific details set forth, which are merely exemplary, but should be determined from the appended claims, which are to be interpreted as broadly as the state of the art will permit.

It is claimed:

1. A method for making washable wall paper, comprising decorating a paper web while it is on the paper making machine, partially drying the web, coating said web with a composition containing a potentially water-insoluble protein, drying the coated web, fixing said coating by subjecting the same to a fixing agent comprising one of the group consisting of alum and formaldehyde, softening the coated web and simultaneously embossing said web and printing on said web with a water-insoluble ink.

2. A method for making washable wall paper, comprising decorating a paper web while it is on the paper making machine, drying the web, coating said web with a composition containing a potentially water-insoluble protein, drying the coated web, fixing said coating by subjecting the same to a fixing agent comprising one of the group consisting of alum and formaldehyde, softening the coated web with steam and simultaneously embossing said web and printing on said web with an oil ink.

3. A method of producing washable paper, comprising forming a paper web carrying a potentially water-resistant protein coating in an aqueous carrier, applying during the paper making operation a material which will chemically fix said coating, drying the web, then softening the dried coating and printing on said softened coating with a water-insoluble ink.

4. A method of producing washable paper, comprising forming a paper web carrying a potentially water-resistant protein coating in an aqueous carrier, applying a material which will fix said coating during the paper making operation, drying the web, steaming the web to soften said coating, and simultaneously embossing and printing said web at the bottom of the depressions in the embossing with a water-insoluble ink.

RUTH E. BRIGHT,
Administratrix of the Estate of Charles G. Bright, Deceased.