

April 28, 1953

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2,636,833

METHOD OF PRODUCING SUPERCALENDERED PLASTICIZED GLASSINE PAPER

Filed Nov. 7, 1952

2 SHEETS—SHEET 1

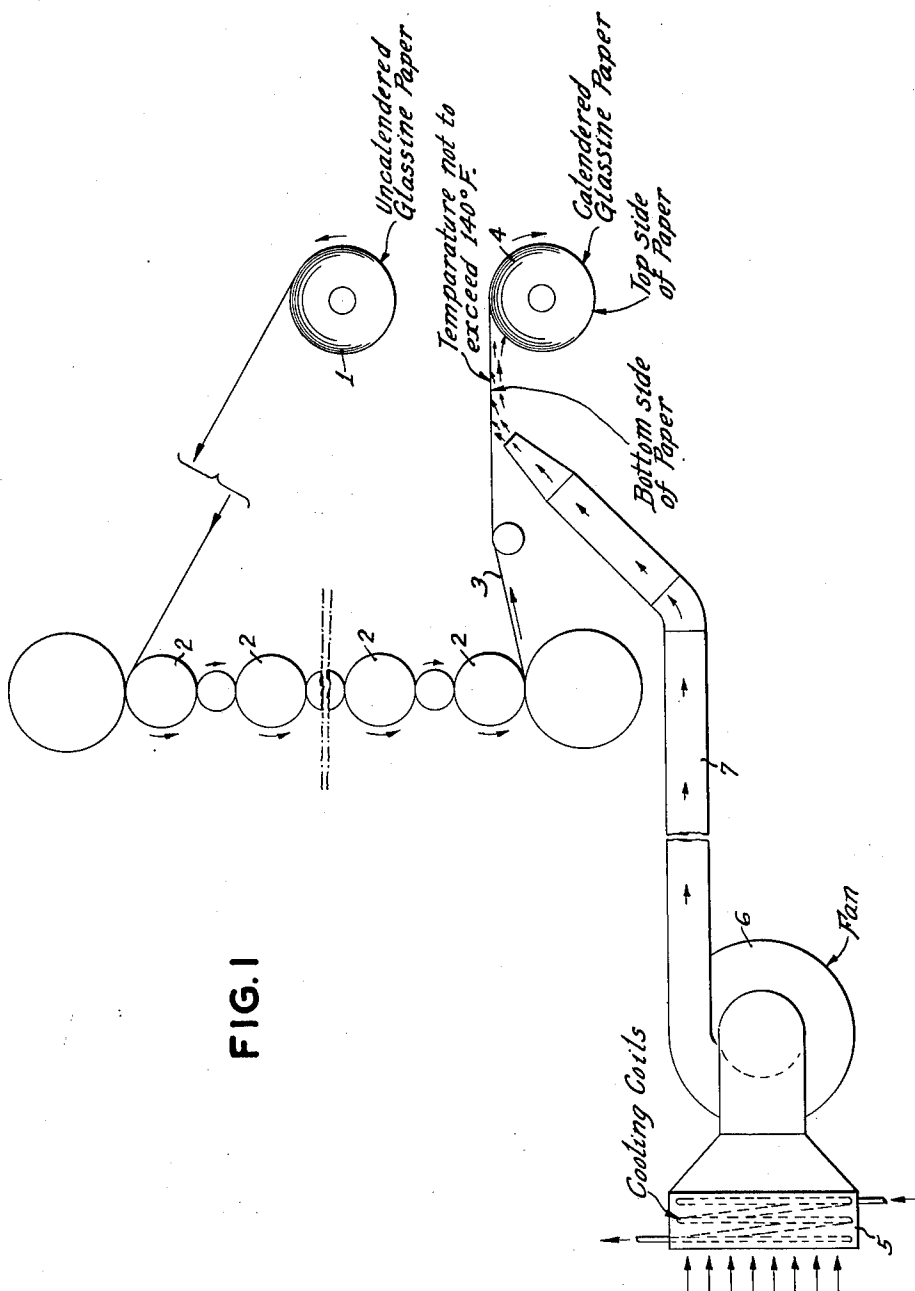


FIG. 1

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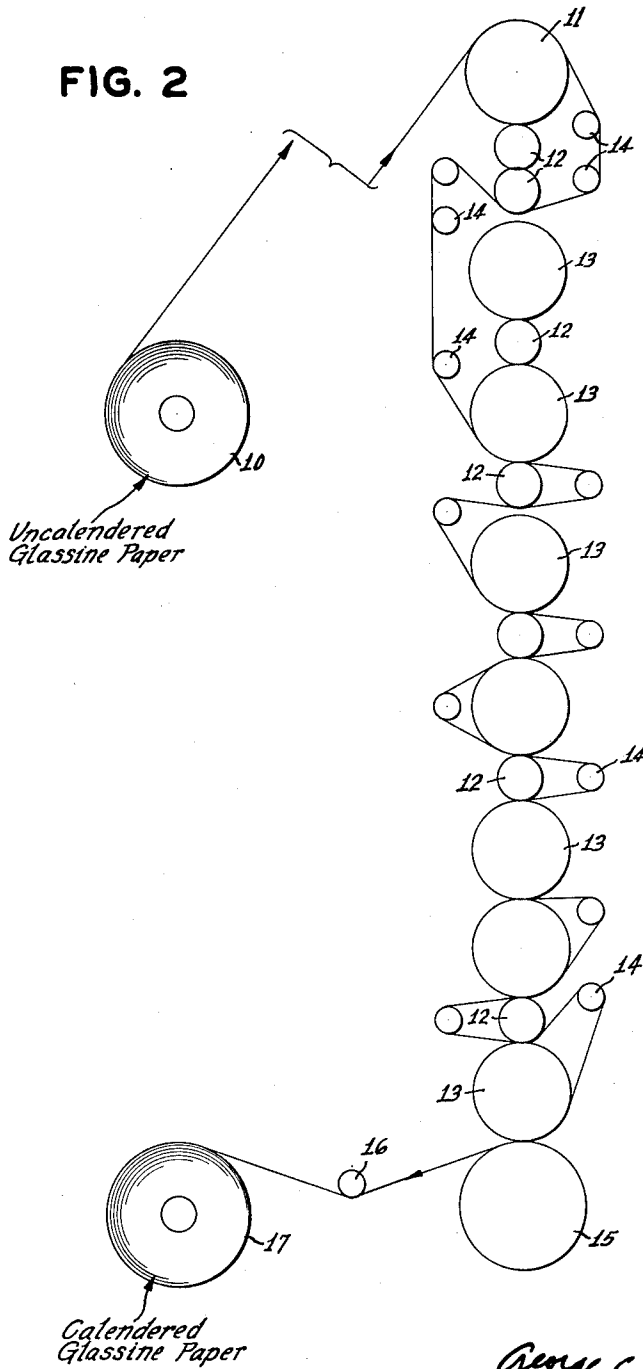
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Filed Nov. 7, 1952

2 SHEETS—SHEET 2

FIG. 2



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2,636,833

METHOD OF PRODUCING SUPERCALENDERED PLASTICIZED GLASSINE PAPER

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Application November 7, 1952, Serial No. 319,303

3 Claims. (Cl. 117-65)

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This invention relates to improvements in the manufacture of supercalendered glassine paper and more particularly to the production of such paper with a high content of invert sugar as a plasticizer.

It has heretofore been proposed to improve the pliability of glassine paper by the addition of glycerine, hygroscopic salts and sugars to impart to the paper a desirable plasticity. See, for example, United States Patents Nos. 1,914,798; 2,058,961; 2,268,674 and 2,403,697.

In the summertime, when the humidity becomes quite high, difficulties are presented when highly hygroscopic substances such as glycerine, glycols and hygroscopic salts such as calcium chloride are used by the picking up of an excessive amount of moisture which causes the paper to become gray, soft, and very raggy, all of which are undesirable, as the transparency of the glassine is decreased, and articles wrapped therewith give the appearance of oldness and staleness of the wrapper.

Invert sugars which do not hold such large quantities of moisture are more desirable as plasticizing agents during the summer months, but their use in large amount tends to cause caramelization of the sugar which in turn tends to darken or yellow the glassine paper when subjected to supercalendering treatment. This takes place with or without the admixture of hygroscopic salts if the proportion of sugar is great enough. The supercalendered glassine paper is commonly rolled up into rolls where the paper tends to remain hot for a considerable period of time.

The temperature at which supercalender rolls are run varies between temperatures, e. g., around 270 to 300° F. to lower temperatures between 200 and 250° F. The speed at which the paper is run through the supercalendering rolls is around 450 feet to 1000 feet per minute. The time required for passing the paper through the supercalender is a small fraction of a minute and may be only a few seconds. But during this operation, the paper is compressed between the calender rolls and is heated by the rolls and, at the same time, it is cooled on one side, where it passes around the rolls, and on both sides in its travel between the rolls. The temperature of the paper is usually considerably below that of the heated rolls but may approach the temperature of these rolls. And the temperature of the paper may vary at different parts of the calender and at different portions of the width of the paper. The paper, or a part of the paper, may thus, during its travel through the supercalender, be

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heated to temperatures above, and often considerably above, 160°, and to temperatures as high as 185 or 200° F. or higher, but below that temperature which will injure the paper.

Where plasticized glassine papers of the character above referred to are subjected to supercalendering and leave the rolls and are rolled up into a paper roll, at temperatures above or materially above 160° F., there is a tendency to cause caramelization of the sugar and darkening or yellowing of the paper, and to some extent weakening and brittling of the product, with resulting rejection and loss of the paper.

I have found that there is a critical temperature below which danger of caramelization or yellowing of the supercalendered glassine paper is obviated, and that glassine paper plasticized with a high content of invert sugar can readily be produced and kept without danger of darkening by rapidly cooling the hot, supercalendered paper below the critical temperature as it leaves the supercalender and before it is wound into a roll. This critical temperature is in the neighborhood of 140 to 150° F., which is a radically lower temperature than the high temperature of the supercalender rolls and also materially below the temperature to which the paper itself is heated during its passage through the supercalender. This temperature, as above indicated, is above and frequently very much above 160° F.

The cooling of the supercalendered glassine paper from a temperature which would cause objectionable discoloration to below the critical temperature can be accomplished by blowing cold air against the paper as it passes from the supercalender to the wind-up roll or by passing the paper in contact with chilled rolls or by running the temperature of the last calender roll at a temperature which will accomplish the required reduction in temperature.

I have found that by blowing a strong current of cold air onto the paper as it leaves the supercalender and before it is wound into a roll the temperature can be rapidly lowered and kept below about 140° F., and that color reversion does not take place in the paper so treated.

I have further found that by proceeding in this way I have been able, during the humid summer months, to use only invert sugars to plasticize the glassine papers without danger of darkening the color.

The use of invert sugar alone in the summertime is advantageous, avoiding excessive water absorption and retention, while imparting a desirable degree of hygroscopicity and plasticity to the supercalendered glassine. Papers having a

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high degree of plasticity and containing in excess of 10% of plasticizer can thus be prepared with the use of invert sugar alone as the plasticizer. Even with this high content of invert sugar danger of discoloration caused by caramelization was readily obviated by promptly and rapidly cooling the supercalendered paper to a temperature below about 140° F.

In the case of glassine paper which is to be lacquered or waxed after supercalendering, I have used a solution containing up to 45% invert sugar in treating the glassine paper on the size press in the dryer train prior to supercalendering with a plastic retention in the paper of about 15% of the invert sugar. This quantity of invert sugar makes the paper soft, with a good finish, and it does not pick up the excessive amounts of moisture which glycerine and various hygroscopic salts such as calcium chloride, magnesium chloride or sodium nitrate would tend to pick up.

I have also found that during the winter months, under low humidity conditions, invert sugars retain the moisture within the sheet more tenaciously than glycerin and give up the moisture more slowly. However, under such conditions, glycerin and other such liquid plasticizers, such as ethylene and diethylene glycol, etc., have the added advantages that they will hold a greater quantity of moisture at the start of the drying out operation, so that there is more water to be lost, and that they do not crystallize but will remain liquid and in turn will prevent the sugars from crystallizing. It is accordingly advantageous during the winter months to use a small percentage of glycerin or other fluid, liquid plasticizers in conjunction with a high proportion of the invert type of sugars. Thus, in the wintertime, for glassine paper which is to be supercalendered, a mixture of about 1 part of glycerin or glycerin-type plasticizer is advantageously used with about 2 parts of invert sugar.

The method of treating the glassine paper with the invert sugar, prior to supercalendering, may be that which has been heretofore described, for example, in the United States Patent to Bidwell No. 1,914,799, in which the invert sugar or mixture of invert sugar and glycerin-type plasticizer is applied in a size press located at an intermediate stage of the dryer train. The plasticizing invert sugar solution can also be applied in part to the partially dried web of glassine paper on the dryers and in part after the paper is completely dried, as described in United States Patent No. 2,058,961.

The uncalendered and plasticized glassine paper, plasticized with a high content of invert sugar, is then subjected to supercalendering treatment by passing over supercalender rolls heated to a high temperature, around 270 to 300° F., and heated to temperatures during the supercalendering as high as 180 or 200° F., or higher so that the paper leaves the supercalender at temperatures materially above 160° F. After leaving the supercalendering rolls and before the supercalendered paper is rolled into a roll, the paper is rapidly and effectively cooled by a blast of cold air to a temperature below the critical temperature, around 140 to 150° F.

Arrangements of apparatus for treating the uncalendered paper to supercalender and cool it are shown in a somewhat conventional and diagrammatic manner in the accompanying drawings, in which

Fig. 1 shows an arrangement for cooling the

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paper with cold air after supercalendering and before rolling the paper into rolls; and

Fig. 2 shows an arrangement of supercalender rolls with provision for cooling the paper before it leaves the supercalender.

In the arrangement of apparatus shown in Fig. 1, a roll of the uncalendered plasticized glassine paper, plasticized with a high content of invert sugar, is supplied by the roll 1 and passed over the heated supercalender rolls 2. The hot supercalendered paper as indicated at 3 passes to the calendered paper roll 4 and on its travel between the supercalender rolls and the paper roll it is subjected to a blast of cold air which passes over the cooling coils 5 and is blown by the fan 6 through the pipe 7 which has its discharge outlets directed against the bottom side of the paper and also against the top side of the paper as it is being rolled on the roll. Such a blast of cold air rapidly cools the hot supercalendered glassine paper below 140° F. so that the paper in the roll is kept well below the critical temperature.

In the arrangement of apparatus illustrated in Fig. 2, the uncalendered and plasticized glassine paper, plasticized by the high content of invert sugar, is supplied by the roll 10. The supercalender is made up of an upper steel roll 11, steam heated rolls 12, paper rolls 13, guide rolls 14, and a lower roll provided with cooling means 15, and with a guide roll 16 for the paper going to the wind-up roll 17 for the calendered glassine paper.

In this apparatus the uncalendered glassine paper from the roll 10 passes over the top roll 11 and around guide rolls 14 and between the steam heated rolls 12 and the paper rolls 13, where it is subjected to supercalendering pressure and also heated by the steam heated rolls. The paper is cooled by the air in its passage around the guide rolls. With the steam heated rolls heated by steam at around 300° F., the paper will be rapidly and momentarily heated during its passage between the heated rolls and the paper rolls and may reach temperatures around 180 or 200° F. or higher and, unless specially cooled, would come off of the supercalender and go to the wind-up roll at temperatures above, and often materially above, 160° F. By passing the paper over the cooled roll 15, or by omitting steam from the lower steam heated roll 12, or both, the paper can be readily and rapidly cooled to below 140° F. before it passes over the guide rolls 16 and is wound up on the roll 17.

By such rapid cooling of the hot, supercalendered paper, it is possible, as above indicated, to produce an improved plasticized supercalendered glassine paper of desirable pliability with a high content of invert sugar and with the use of such sugar alone in the summertime when humidity is high, and without danger of objectionable caramelization or color reversion of the supercalendered glassine paper.

Similarly, in the wintertime, under conditions of low humidity, an improved plasticized supercalendered glassine paper can readily be produced with a major proportion of invert sugar and a smaller proportion of liquid type glassine plasticizer as the plasticizing material.

This application is a continuation-in-part of my prior application Serial No. 110,567 filed August 16, 1949, now abandoned.

I claim:

1. The method of producing plasticized, supercalendered glassine paper which comprises ap-

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plying to the glassine paper a plasticizing composition containing invert sugar as its principal plasticizing medium, supercalendering the plasticized glassine paper by passing it over heated rolls and heating the paper during supercalendering to a temperature above 160° F., which would cause caramelization or discolorization of the invert sugar if the supercalendered paper were permitted to cool slowly, the maximum temperature to which the paper is heated during the supercalendering being below that temperature at which the paper will be injured, rapidly cooling the paper after the supercalendering thereof to a temperature below about 140° F. so that caramelization or discolorization of the paper

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does not take place, and thereafter rolling the cooled supercalendered glassine paper in a roll.

2. The method according to claim 1 in which the paper is cooled by directing a blast of cold air against both sides of the hot paper as it passes from the supercalendering rolls to the roll on which the cooled paper is rolled.

3. The method according to claim 1 in which the plasticizing composition contains in addition to the invert sugar a compound from the class consisting of glycerine and the glycols.

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No references cited