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METHOD OF AND APPARATUS FOR FINISHING GLASSINE PAPER

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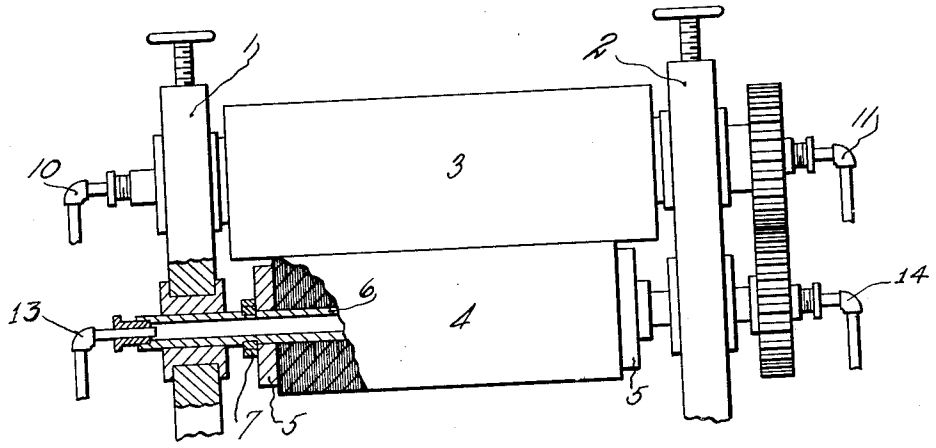

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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR FINISHING GLASSINE PAPER

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This invention relates to improvements in the methods of and apparatus for finishing paper and is directed particularly to methods of and apparatus for finishing thin, highly polished and transparent paper such as glassine paper.

According to one well known method of finishing ordinary paper, it is passed between pairs of heavy metal rolls which are arranged to exert a considerable pressure to the paper and according to the particular paper being finished or the particular finish desired the rolls may be heated. The amount of pressure, heat and speed of the rolls is ordinarily variable so that the method and apparatus may be sufficiently flexible to provide a wide range of finishes to various kinds or grades of paper.

Glassine paper has peculiar characteristics so that it may be used for particular purposes and is thin and transparent as compared with ordinary papers and has a high gloss. Before the finishing operation, this paper resembles tissue paper in that it is thin and substantially opaque so that in order to attain the required transparency and high gloss, it must be subjected to heavy pressure uniformly applied thereto throughout its width as well as considerable heat, these being the important factors which produce the effect or finish which is characteristic of this grade or kind of paper.

The method and apparatus previously described is not adapted to produce the quality of paper to meet the present day exacting requirements, and is objectionable for the following reasons. It is impossible to finish the rolling surface or a pair of metal rolls so that they are exactly true or even sufficiently true as to be capable of exerting an even pressure uniformly to the paper throughout its width and the result is that the paper finished thereby is not uniformly transparent but has blotches or spots which are less transparent and more opaque than the unblotched portion of the paper.

According to one novel feature of my invention, I provide a method which consists in finishing glassine paper by means of a pair of rolls which have rolling surfaces adapted to conform with one another and is accomplished by providing a metal roll which has a substantially hard rigid surface, while the other may be of a fibrous or yieldable material so as to have a relatively resilient or yieldable surface as compared with the other, to the end that the surface of the latter may conform to any unevenness of the surface of the former in their rolling contact so that a uniform even pressure is applied across the paper as is desirable and necessary.

According to another novel feature of the invention, the metal roll may be heated as is usual or desired to facilitate the finishing operation, while the other roll which absorbs heat and therefore is subject to deterioration is interiorly cooled to overcome the action of the heat to the end that a pair of rolls is provided which will have the long life desired and at the same time possess the ability to exert the even pressure and apply heat necessary for producing the desired hard, smooth finish and give the transparent effect.

The invention may be practiced in various ways but in order to illustrate the novel features thereof in the form at present preferred reference will be made to the accompanying drawing, in which:

The figure is a diagrammatic representation of an apparatus embodying the novel features of my invention by the means of which the method of my invention may be practiced.

Referring to the drawing in detail, 1 and 2 represent portions of the end frames or standards of a typical calender, which may be arranged in fixed spaced relation so as to be adapted to guide the journal boxes of a plu-

rality of rolls in stacked relation one above the other. In the drawing, a single pair of rolls 3 and 4 is shown, but it will be understood that other pairs may be located adjacent thereto if it is desired in finishing paper that the paper pass between more than one pair.

The roll 3 is preferably of metal and is of course machined on its periphery so as to have as far as possible a smooth even surface throughout its length. The metal employed for the roll will be preferably such as will provide a substantially rigid and hard surface.

The roll 4 is preferably formed of some non-rigid material as distinguished from the metal roll just described and may be of a fibrous nature such as cotton, stalks or the like. The roll body is preferably formed by binding or clamping a plurality or stack of discs or laminations of suitable material between metallic binders or headers 5 which may be held in clamping relation on a hollow shaft or arbor 6 by means of locking collars 7. The particular form of construction is not important for the practice of the invention, except in so far as the characteristics of the body of the roll are concerned and I make mention of cotton laminations because I have found it possible by applying pressure to the ends of a stack of cotton laminations and the like to force them together to thereby provide a substantially firm and solid unified body portion. The laminations are machined to provide a smooth even rolling surface to the roll similar to the surface of the roll 3 against which it acts. By providing the roll 3 with a hard, smooth and substantially rigid surface and a smooth but less hard or relatively yieldable or resilient surface to the roll 4, it will be obvious that when in rolling contact the surface of the roll 4 will tend to conform to any unevenness of that of the roll 3 so that in effect there will be an even uniform pressure applied throughout the width of paper passing through the bight of the rolls, as distinguished from a non-uniform pressure where rolls are employed which have equally rigid surfaces.

The roll 3 is preferably heated to some degree depending upon conditions and this may be accomplished by providing an opening therethrough so that steam or any heating medium may be introduced at one end, as by a pipe 10 and conducted therefrom as by a pipe 11.

The roll may be heated, of course, to any desired or required degree and where a plurality of pairs of rolls are employed, those rolls corresponding to the heated metal roll 3 may be connected by suitable piping with some convenient means for supplying the heating medium.

To provide the proper degree of transparency and gloss to glassine paper, some degree of heat is necessary as well as is some degree of pressure, and it will be apparent that both heat and pressure may be controlled so as to obtain the desired amount of heat for a certain amount or degree of pressure and vice versa.

Heat radiated by the roll 3 is absorbed by the metal parts of the roll 4 so that the body of the roll 4 becomes heated, which tends to char the laminations comprising the roll body, particularly in the vicinity of the central metal arbor and at the ends adjacent the members 5. As the material becomes charred, there is a tendency for it to give way under pressure and results in the roll becoming uneven on its surface and thereby destroys the ability to conform to the surface of the metal roll. To overcome this, it is preferred to introduce a cooling medium to the central hollow shaft which may be conducted thereto by a pipe connection 13 and a similar connection 14 for conducting the same from the roll.

By thus introducing a cooling medium, the temperature of the shaft may be controlled so that the heating tendency of the roll 3 is overcome. It is not intended to cool the roll 4 so that it will affect the temperature of the roll 3 but rather it is desired to control the temperature of the roll 4 to such an extent that the heat of roll 3 will not injuriously affect it. By thus controlling the temperature, the action of the pressure and heat for the finishing operation is not interfered with or in any way impaired.

As with the roll 3, if a plurality of pairs of rolls are employed as in a stack, a number of rolls such as 4 may be suitably connected together for the circulation of a suitable cooling medium.

The particular form of connections of the rolls is not of vital importance but they of course will be such as will permit a free rotation of the rolls for the calendering or finishing operation.

From the foregoing it will be observed that I have provided a method and apparatus for finishing paper by means of a pair of rolls which are constructed and arranged so that one has a substantially rigid surface while the other has a relatively yieldable surface, whereby I am able to attain an even uniform pressing contact while heat is applied to one roll to facilitate the finishing of the paper; the deteriorating effect of the heat to the other is overcome by cooling or controlling the temperature thereof without in any way interfering with the heat required for the finishing operation.

I am aware that many changes may be made in the form of the invention without departing from the scope thereof, and I prefer therefore to be limited if at all by the appended claim rather than by the foregoing description.

What I claim is:

An apparatus for making glassine paper by finishing substantially opaque paper so that it becomes transparent and has a polished surface comprising, a pair of supports and a pair of coacting pressure rolls journalled therein, one of said rolls including a substantially rigid hollow metal body for receiving a heating medium, the other including a hollow metal shaft for receiving a cooling medium and a plurality of laminations of fibrous material held in a pressed together relation thereon to form a substantially non-rigid body and provide a yieldable surface to conform to that of said metal roll.

In testimony whereof I have affixed my signature.

PAUL W. BIDWELL.