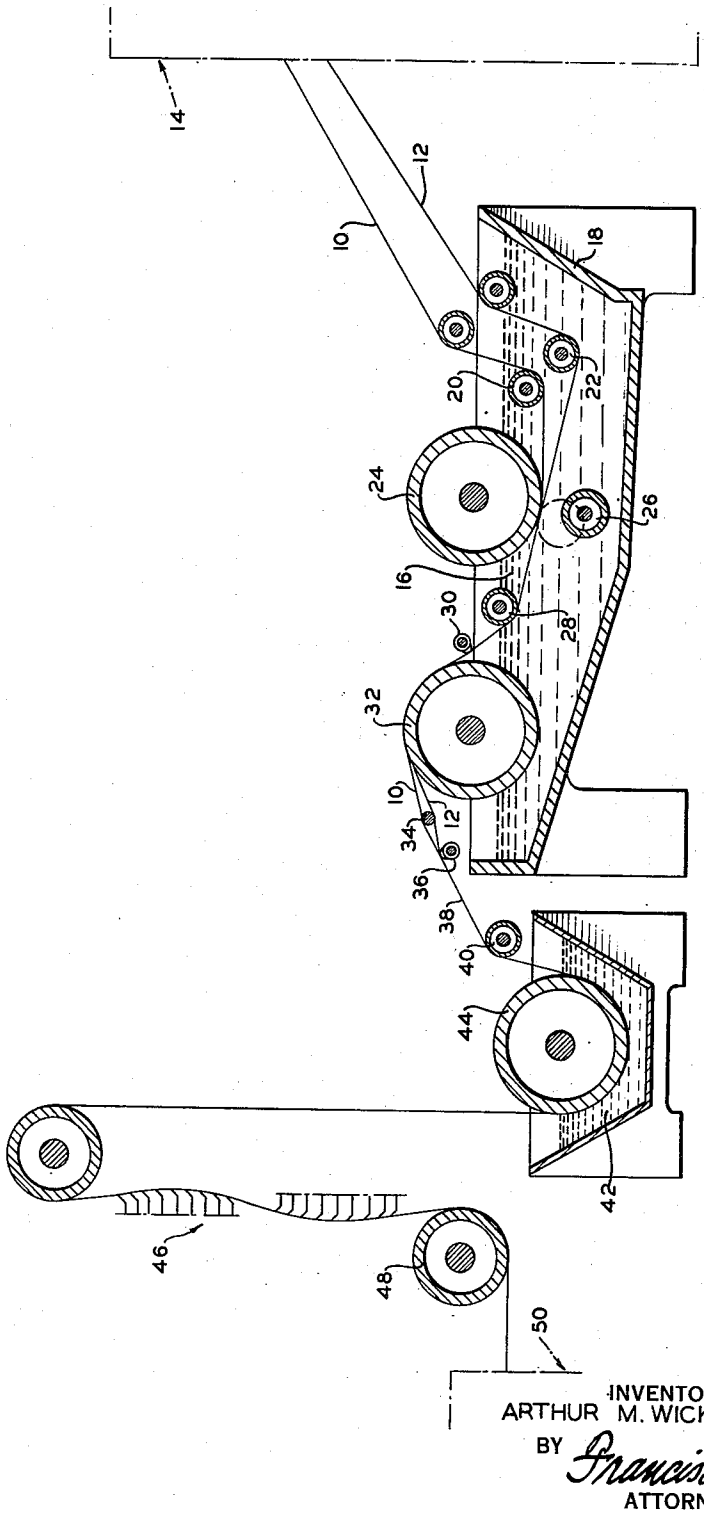
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METHOD AND APPARATUS FOR WAX LAMINATION

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METHOD AND APPARATUS FOR WAX LAMINATION

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This invention relates to wax lamination of sheets or webs of paper, and aims to provide an improved method and apparatus for laminating paper webs with wax, wherein the amounts of wax between the layers and on the exposed surfaces of the completed web are accurately controlled in an improved manner.

In the copending application of William F. Grupe, Serial No. 187,839, filed January 21, 1938, there is disclosed a method and apparatus for laminating printed webs of paper with wax. According to this method, a plurality of webs are laminated, and the amounts of wax between layers is controlled, by passing the webs into a bath of wax and subjecting them to pressure within the bath. While this procedure has been satisfactory, it has been found that when the complete apparatus is operated at speeds in excess of 400 feet per minute, the amount of wax between the layers is difficult to control. Because of the difficulty in maintaining a uniform tension in the webs and because of the lubricating action of the molten wax, the webs tend to separate while in the bath and admit additional wax which accumulates at the point where the combined web passes over the equalizer bar, just prior to leaving the laminating unit. Such accumulated wax flows from between the layers and spreads to the outside of the web, thus forming a heavy or thickened waxed edge which is unnecessary and undesirable.

I have found that these difficulties may be successfully overcome and that the amounts of wax between and on the outside of the layers may be accurately controlled by passing the webs through a wax bath and then regulating the thickness of the film of wax on all surfaces of the webs outside of the bath.

According to my invention, two webs of paper, which may be printed or not, as desired, are led angularly into a bath of molten wax. The individual webs are then passed beneath a roller which is at least partially submerged in the wax; and said webs come naturally together at a position beneath the surface of the wax and are led out of the bath. As the waxed webs are led out of the bath, the exposed surface of the upper web or layer is regulated to a predetermined thickness by contact with an equalizer bar. The two webs are then separated by an equalizer bar which acts to regulate the thickness of the wax layer on the inside surfaces of the two webs. They are then passed over another equalizer bar which regulates the thickness of the waxed layer on the exposed surface of the lower web; and finally are joined together and passed into a cooling bath for setting the completely laminated web which is then dried and cut into sheets or rewound. The joining or final laminating of the webs may take place subsequent to, but preferably at the same time as, the last metering operation on the bottom of the web.

Apparatus for practicing the above-outlined method may include a container for holding a bath of molten wax, guiding means for guiding the web into and out of the bath of wax, a first equalizer bar for regulating the thickness of the wax on the exposed surface of the upper layer, a second equalizer bar for simultaneously regulating the thickness of the film of wax on the inside surfaces of the web, and a third and last equalizer bar for regulating the thickness of the layer of wax on the exposed surface of the lower web. Such an apparatus and method permit the webs to be laminated at speeds in excess of 400 feet per minute, and effect an accurate control of the amount of wax between layers and on the exposed surfaces of the laminated web.

The above and other features and objects of the invention will become apparent upon consideration of the following detailed description and the accompanying drawing, wherein the single figure is a diagrammatic representation of one form of apparatus with which my improved method of wax lamination may be effectively carried out.

As shown in the drawing, a pair of paper webs, including an upper web 10 and a lower web 12, are led downwardly at an angle from a printing press 14 into a bath of wax 16 contained in a suitable housing or tub 18. When the completely laminated web is to be used for wrappers, the upper and lower webs 10 and 12 may have suitable markings applied upon their exposed surfaces, and the printing unit 14 includes means for varying the movement of at least one of the webs so that when they are finally brought together and laminated the markings on the upper and lower surfaces thereof will be in register. The webs 10 and 12 are led beneath guide rollers 20 and 22, respectively, to a large roller 24 partially submerged in the wax bath 16 and preferably driven during operation of the apparatus. In order to facilitate threading of the apparatus prior to operation, a cooperating feed roller 26 may be provided, but such a roller is moved to the position shown in the drawing after the apparatus has been threaded and is set in operation. It will be noted that the two webs 10 and 12 come naturally together in passing beneath the

large roller 24 and are guided out of the bath by means of a guide roller 28. While this arrangement of the apparatus is desirable, it will be apparent that the guide rollers may be arranged to feed the two webs through the bath 16 without their coming together in this manner.

On emerging from the wax bath 16, the upper surface of the web 10 is passed into contact with an equalizer bar 30 which may be of any suitable construction and acts to regulate the amount of wax remaining on the exposed upper surface of the combined web. After passing over the metering bar 30, the two webs 10 and 12 are led over a large roller 32 to a separating and double equalizer bar 34. This bar 34, which may be a bar about one inch in diameter and wound with rather fine wire, is positioned and arranged to separate the webs 10 and 12 and bear against the adjoining or inside surfaces thereof so as accurately to regulate the amount of wax adhering to said surfaces, and consequently to regulate definitely the amount of wax between the layers of the completely laminated web. The arrangement of the apparatus thus far described is such that the wax between the webs 10 and 12 is still molten when it reaches the double equalizer bar 34, so that any surplus and accumulated wax will flow back into the bath 16. Next, the webs 10 and 12 are led over an equalizer bar 36, similar to the equalizer bar 30, which, contacting the lower or exposed surface of the web 12, regulates the amount of wax adhering to this surface. Finally, the webs 10 and 12, with the amount of wax on each of their surfaces accurately regulated, are brought together or laminated into a combined or completed web 38. As shown in the drawing, the bringing together or joining of the webs preferably takes place simultaneously with the regulating operation on the bottom of the web; but, by using an additional roller beyond the equalizer bar 36, such joining may be arranged to take place subsequent to the last regulating operation, if desired. After the final joining or laminating, the combined web may be passed over a guide roller 40 into a cooling bath 42. The cooling bath 42, which preferably consists of a container of chilled water, causes the wax to become set and the layers firmly adhered together and simultaneously glosses the exposed surfaces. The completely laminated and glossed web may then be led about a large roller 44 and guided through a suitable dryer 46. It may then be passed over guide rollers 48 to any subsequent web treating device 50, such as a cutter, perforator, or rewind mechanism.

From the foregoing description, it will be apparent that by my present invention, I have provided a method of wax laminating a plurality of webs wherein the amounts of wax on the exposed surfaces of the completely laminated web and between the layers thereof are accurately controlled. With the apparatus and method described, it is possible to operate at web speeds greater than 400 feet per minute. While I have described the invention as combined with a printing unit such as is disclosed in the copending application of William F. Grupe, above referred to, it will be understood that the invention is not limited in its use to such a combination. Moreover, various changes may be made in the construction and method, and certain features or steps thereof may be employed without others, without departing from my invention or sacrificing any of its advantages.

What I claim is:

1. A method of wax laminating two webs of paper, which comprises passing said webs into a bath of wax and permitting them to come together naturally within the bath; leading said webs out of the bath and regulating the amount of wax on the exposed surface of the upper web to a layer of predetermined thickness; separating said webs and regulating the amount of wax on the adjoining inside surfaces of said webs to layers of predetermined thickness; and regulating the amount of wax on the exposed surface of the lower web to a layer of predetermined thickness and laminating the thus waxed webs.

2. Apparatus for laminating two webs of paper, comprising a bath of molten wax; means for guiding said webs through said bath; a first equalizer bar for regulating the amount of wax adhering to the exposed surface of one of said webs; a double equalizer bar for separating the webs and simultaneously regulating the amount of wax adhering to the inside adjoining surfaces of said webs; and a second equalizer bar for regulating the amount of wax adhering to the exposed surface of the other of said webs, the position of said second equalizer bar with respect to the path of the webs being such that said webs are reassociated into a laminated web in passing thereover.

3. Apparatus for laminating two webs of paper, comprising a bath of wax; a roller disposed within said bath for guiding said webs therethrough and permitting them to come naturally together beneath the surface of the wax; means for regulating the amount of wax adhering to the exposed surface of the upper web; means for separating said webs and simultaneously regulating the amount of wax adhering to the inside adjoining surfaces of both of said webs; and means for regulating the amount of wax adhering to the exposed surface of the bottom web, said last regulating means being arranged to cause the two webs to be joined as they pass thereover.

4. Apparatus for laminating two webs of paper, comprising a bath of molten wax; means for guiding said webs through said bath; a first equalizer bar for regulating the amount of wax adhering to the exposed surface of one of said webs; a double equalizer bar for separating said webs and simultaneously regulating the amount of wax adhering to the inside adjoining surfaces of said webs; a second equalizer bar for regulating the amount of wax adhering to the exposed surface of the other of said webs and for causing said webs to be joined as they pass thereover; and means for chilling and glossing the thus waxed webs.

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