

UNITED STATES PATENT OFFICE.

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PROCESS OF PREPARING PULP HAVING WAX-IMPREGNATED FIBERS.

1,344,620.

Specification of Letters Patent. Patented June 29, 1920.

No Drawing.

Application filed April 21, 1919. Serial No. 291,654.

To all whom it may concern:

Be it known that I, FRANK B. DAVIDSON, a citizen of the United States, residing at Marseilles, in the county of La Salle and State of Illinois, have invented new and useful Improvements in Processes of Preparing Pulp Having Wax-Impregnated Fibers, of which the following is a specification.

This invention relates to a process whereby the waste or scraps of waxed papers or waxed box-boards, such as scraps of wax saturated papers and scraps of wax coated papers and box-boards and the like, which heretofore have had little or no value as material for paper making by the practice heretofore employed because of the presence of wax therein, may be used for preparing pulp for paper making and permit the production of a paper sheet or web which in the initial making thereof may have one or more or all of its plies formed of wax impregnated fibers, so that the article or product made from a web or webs so formed may be rendered moisture and water resistant.

It has been the practice heretofore, in making waxed papers and waxed box-boards and the like, to apply the wax after the paper or box-board has been made from a pulp free from wax, as by either forcing the wax into the paper sheet from the outside thereof, or by applying a coating or layer of wax on the outside of the same. In applying wax in the manner first mentioned, the fibers of the sheet along the exposed surfaces thereof in particular are impregnated with wax, while in waxing the sheet in the second manner the wax is in the form of a layer or coating on the outside of the sheet, with the fibers of the sheet free from wax. In the first case the sheet is said to be saturated with wax, while in the second it is merely coated. Papers saturated with wax are generally used to make bread wrappers, liners, drinking cups, and the like, where a thin stock is required, while papers coated with wax are usually heavier or thicker and are used for making cartons, boxes, and other receptacles for containing butter, bakery products and edibles, or any merchandise required to be packed in moisture proof packages. No matter which of the two meth-

ods is followed, the step of applying wax is an additional one required after the paper sheet has been formed from pulp free from wax, whereas by my novel method, now to be described, the application of wax to the paper sheet is accomplished during the production of the paper sheet initially, thereby eliminating the necessity for the subsequent application of wax to the sheet to obtain moisture or water resistant qualities and producing similar results, at much less expense.

In carrying out my novel process, I take a quantity of scraps or waste of the heavily coated or saturated waxed papers and mix them with a quantity of scraps or waste of the waxed papers carrying a lighter proportion of wax, the mixture being in such proportion to insure having enough waxed fibers in it to impregnate with wax all of the fibers present therein. The mixture is then introduced or placed into the cooking chamber of a cooking apparatus, preferably a rotary cooker, with just enough water being added to reach all of the individual parts of the mass. The openings to the cooker are then closed and the mass cooked and revolved for a desired length of time, say about five or six hours, under a steam pressure of about thirty to forty pounds to the square inch. The steam is then shut off and the cooker revolved for an additional length of time, for about one or two hours, while the pressure is falling. During the cooking operation the action of the heat, moisture, and pressure softens the fibers and the wax and causes the surplus wax liberated from the mixture and the waxed fibers to be forced into the unwaxed fibers, the agitation imparted to the mass during the rotation of the cooker serving to loosen up and separate the fibers and insure that all of them will be reached to be impregnated with wax. After the cooking operation has been completed, the cooked mass is removed from the cooker, there being practically no waste or free water to carry away any part of the wax, because the mixture was prepared initially in such proportions that the unwaxed fibers of the mixture would carry what wax would be liberated from the heavily waxed fibers, with the result that there is practically no free wax after the cooking operation has been

completed. Then follows the usual and well known method of reduction of the cooked mass into pulp and the conversion of the latter into paper or paper-board. By the process described, papers which are heavily waxed have the surplus wax liberated by the heat applied during the cooking operation and forced into the softened unwaxed fibers, thereby gaining a mass all of the fibers of which will be impregnated with wax. If the supply of waste waxed papers on hand is of that kind that are saturated or so heavily coated with wax that there is a surplus of that material, I may add to such papers scraps of unwaxed papers so as to present enough unwaxed fibers to carry the surplus wax liberated from the waxed papers being used and obtain a mass all of the fibers of which will be impregnated with wax.

In my co-pending application, Serial No. 291,655, filed April 21st 1919, I have described the manner of making a paper sheet or web having one or more or all of its plies made from pulp having wax impregnated fibers as produced by the process described herein, so that the sheet as well as the box board may have at least one of its plies made entirely of wax impregnated fibers.

While I have mentioned herein a rotary cooker as the form of cooking apparatus used in carrying out my process, yet it is to be of course understood that any other type of cooking apparatus may be employed provided that steam pressure and agitation may be applied to the mass during the cooking operation. Furthermore, in speaking of waxed papers, I means to include all of such papers which are treated with a material in the nature of wax for giving the paper or paper-board moisture and water proof qualities.

I claim as my invention:

1. The process of preparing pulp having wax impregnated fibers, consisting in mixing together papers having waxed and unwaxed portions so as to have enough waxed fibers to impregnate with the wax liberated from the waxed portions of the papers substantially all the unwaxed fibers that may be present in the mixture, adding enough water to reach all parts of the mixture, and cooking and agitating the mixture under steam pressure to soften the fibers of the

papers and the wax and cause the latter to be forced into the fibers of the papers.

2. The process of preparing pulp having wax impregnated fibers, consisting in mixing together heavily coated or saturated waxed papers with those carrying a lighter proportion of the wax so as to have enough waxed fibers to impregnate with the wax liberated from the waxed portions of the papers substantially all the unwaxed fibers that may be present in the mixture, adding enough water to reach all parts of the mixture, and cooking and agitating the mixture under steam pressure to soften the fibers of the papers and the wax and cause the latter to be forced into the fibers of the papers.

3. The process of preparing pulp having wax impregnated fibers, consisting in mixing together enough heavily coated or saturated waxed papers with those carrying a lighter proportion of the wax to have enough waxed fibers to impregnate with the wax liberated from the waxed portions of the papers substantially all the unwaxed fibers that may be present in the mixture, adding enough water to reach all parts of the mixture, and cooking and agitating the mixture in a rotary cooker under a steam pressure of approximately thirty or forty pounds to the square inch.

4. The process of preparing pulp having wax impregnated fibers, consisting in mixing together enough heavily coated or saturated waxed papers with those carrying a lighter proportion of the wax to have enough waxed fibers to impregnate with the wax liberated from the other portions of the papers substantially all the unwaxed fibers that may be present in the mixture, adding enough water to reach all parts of the mixture, cooking the mixture in a rotary cooker under a steam pressure of approximately thirty to forty pounds to the square inch for a predetermined period of time, and then shutting off the steam and revolving the cooker for an additional predetermined period of time while the pressure is falling, so as to soften the fibers and the wax and cause the latter to be forced into the fibers of the papers.

In testimony that I claim the foregoing as my invention I affix my signature this 18th day of April, A. D. 1919.

FRANK B. DAVIDSON.