

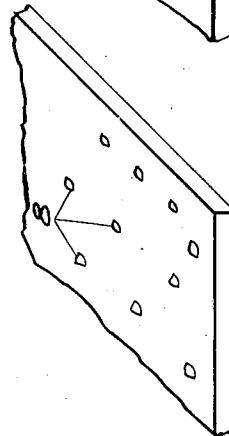
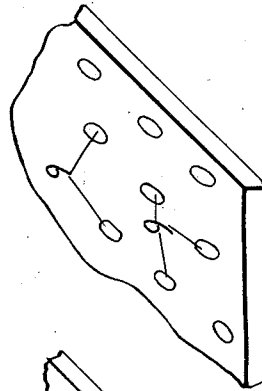
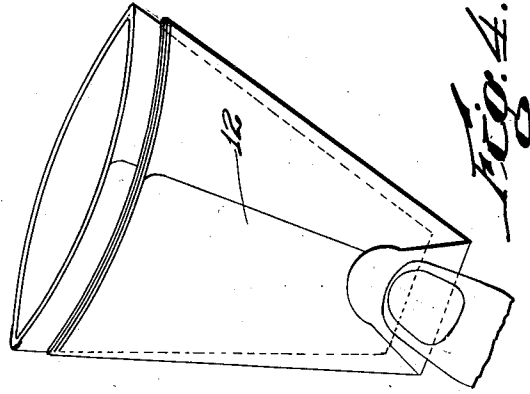
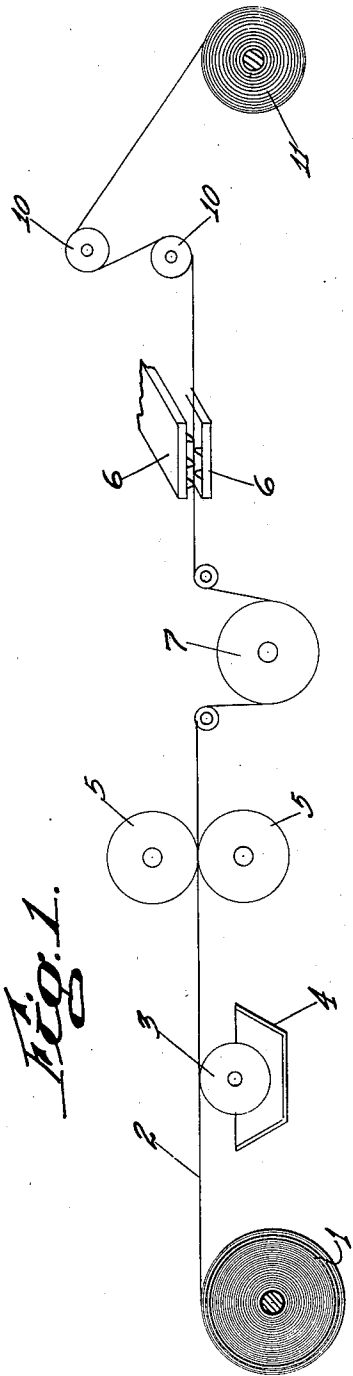
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W. E. SWIFT

1,977,022

PROCESS OF TREATING PAPER AND PRODUCT THEREOF

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PROCESS OF TREATING PAPER AND
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The present invention relates to the conditioning of paper or the like, to reduce its surface friction. The invention is particularly applicable to paper such as is used in the manufacture of drinking cups of the type that are closely nested in one another for stacking in a suitable dispenser or container. This nesting, especially when no bead or lip is provided at the cup rim, involves the most intimate surface contact between the cups, and under these circumstances, considerable difficulty is frequently encountered when the terminal cup of a stack of nested cups is seized in the act of withdrawing it from the dispenser or container, by the tendency of the next-adjacent cup or cups to stick to the terminal cup and so be withdrawn with it; because of this, the operation of a cup dispenser or cabinet loaded with cups of this character is attended with much uncertainty and considerable waste of the cups may take place, since two or more cups are very apt to emerge from the container or dispenser on a single withdrawal motion, when only one cup was intended to be withdrawn.

According to my invention, these difficulties are overcome by a process of treatment for the paper stock used for such cups that, in effect, gives such stock a lubricated surface or surfaces,—thereby effectually overcoming any stickiness or tackiness inherent in the paper or produced therein by the waterproofing treatment ordinarily applied to the stock used for paper cups, and the like. Such stock, conditioned in accordance with my invention, when fabricated into paper cups or like articles that are closely nested for distribution, in a stack, provides such slipperiness between the contacting surfaces of the nested articles that the pressure exerted by seizure of the terminal article of the stack, preparatory to its withdrawal movement, will so react on the adjacent article nested within the seized article as to produce an actual separation of the matching nested surfaces, thus making it impossible for the two articles to be delivered, by a single withdrawal motion. An important feature of my conditioning treatment is found in its application to the paper in the entire absence of impairment of the latter's susceptibility to sticking, by ordinary adhesives, in the subsequent fabrication of the same into cups or other articles. Other and further objects and advantages of the invention will be made apparent in the following detailed description thereof, reference being had to the accompanying illustrative drawing, in which—

Fig. 1 is a diagrammatic view, partly in side

elevation and partly in section, of an arrangement of apparatus adapted to the carrying out of my improved conditioning process.

Fig. 2 is a fragmentary perspective view, on a greatly magnified scale, illustrating the surface of the paper stock at an intermediate point in the process.

Fig. 3 is a view similar to Fig. 2, illustrating said surface at the conclusion of the process.

Fig. 4 is a perspective view of a plurality of nested paper cups, fabricated from paper stock conditioned in accordance with my invention and illustrating the positive separation that occurs, when one of said cups is seized.

Like reference characters refer to like parts in the different figures.

The manufacture of paper receptacles, such as the cups shown in Fig. 4, is ordinarily carried out with paper stock that has been suitably waterproofed, as by impregnation with paraffin, oils, or other waterproofing ingredients; such ingredients frequently leave the surface of the stock in a sticky or tacky condition. Fig. 1 illustrates the treatment of paper stock according to my invention, in conjunction with its subjection to this usual waterproofing operation. Referring to Fig. 1 for purposes of illustration, a supply roll of the paper stock that is to be waterproofed and conditioned is shown at 1. A web of paper 2, progressively unwound from this supply roll, may undergo waterproofing treatment in any ordinary manner, as by passage over and in contact with a roll 3, the latter rotating partially submerged in molten paraffin, for example, or in any other liquid waterproofing ingredient, contained in a trough or vessel 4. The desired impregnation of the web 2 by the waterproofing compound thus received on its surface may be obtained by subjecting said web to heat and pressure, as by passing it between rotating pressure rollers 5, 5, suitably heated by interior circulation of live steam, or in any other way. The above described operation secures a sufficient impregnation of the stock to render it substantially waterproof; at the same time, the surface of the stock is left substantially devoid of any waxy or oily coating such as would render it unfit for sticking, by the use of the adhesives or glues employed in paper manufactures. The above described waterproofing operation of and by itself forms no part of the present invention, being old and well known in the art.

By the present invention, as hereinbefore set forth, I obtain a lubricating effect on the surface of the stock, to reduce the surface friction between nested articles made from said stock, and

to overcome the tendency of the surfaces of said articles to be sticky or tacky, either from an excess of waterproofing compound or from atmospheric or temperature conditions that unfavorably affect said surfaces.

To this end, my invention, for the production of such surfaces, involves initially the spraying of the stock on one or both sides with molten wax or the like, comminuted with air, in accordance, substantially, with the process described in United States Letters Patent of Allen L. Grammer, No. 1,445,273, dated February 13, 1923, for a Method of preventing offset in printing. This may be done by arranging, in operative relation to the web of stock 2, the transversely elongated spraying device or devices indicated diagrammatically at 6, 6 in Fig. 1, the same adapted, in accordance with said patented Grammer process, to effect the collection on one or both sides of the travelling web 2 of minute particles of wax or the like, which may solidify either in their movement onto the web or after they have collected thereon. If the above described spraying operation, for the collection of waxy particles, is carried on in a continuous manner with the waterproofing operation, I have found that better results are obtained, so far as concerns the solidification of the waxy particles, by subjecting the travelling web, as freshly impregnated with the waterproofing compound, to a chilling or cooling operation, as by passing it around a chilling roll 7, arranged intermediate the hot pressure rollers 5, 5 and the spraying devices 6, 6.

For the best results in the practice of my invention, I have found that the above-described spraying of molten waxy material should be performed with a wax or waxy substance which is relatively hard and which has a relatively high boiling point. Carnauba wax, for example, possesses these desirable properties,—but it is to be understood that my invention is not limited to any particular lubricating material, except as specified in the appended claims. The effect of this deposit or collection of waxy particles on the surface or surfaces of the web is illustrated, in highly magnified form, in Fig. 2,—the same exhibiting the solidified particles 8, 8 as rising appreciably from the surface of the sheet or web. The second major step of my conditioning process involves the flattening or ironing out of the deposited particles 8, 8 into separated flat waxy disk-like bearing surfaces 9, 9, as shown in highly magnified form in Fig. 3; this operation, which completes the process, may be effected in any suitable manner, as by drawing the web 2, upon its emergence from the spraying devices 6, 6, around transversely disposed hot polished cylinders 10, 10, which are preferably non-rotatable and are arranged, as shown, to coact with both surfaces of the web, in the event of both sides being sprayed; from these ironing devices 10, 10, the stock, conditioned in accordance with my process, may be rewound on a take-up roll 11, as shown.

The production on the surface of the paper of the separated minute flat lubricating spots 9, 9, in accordance with my invention, imposes no handicap whatsoever to the adhesive sticking of the material when fabricated into various articles of manufacture; for example, the glued seam 12 of a paper cup, as shown in Fig. 4, can be as readily made with my conditioned paper stock as it can be made with unconditioned paper stock. An outstanding advantage derived from my invention is the unfailing facility with which

closely nested articles, such as the paper cups of Fig. 4, may be separated, when made from stock that has been treated as above described. Invariably, when the lowermost cup of such a stack of cups is seized near its bottom for withdrawal from the stack, the slightest pressure of the fingers is sufficient to produce an upward reaction of the other cups, due to the virtual elimination, by my invention, of any appreciable static friction between the inner surface of the lowermost cup and the outer surface of the cup next above. Even if the paper stock itself be sticky or tacky, either inherently, or by reason of its waterproofing treatment, the desired slippage between such surfaces is secured, because the lubricating effect of the minute flattened waxy spots 9, 9 affords sufficient reduction of the friction to insure the desired separation in practically every case.

I am aware that it has been proposed heretofore to impregnate paper with wax or like substances in order to render the same waterproof; I am also aware that it has been proposed heretofore (as in the aforesaid Grammer Patent No. 1,445,273) to collect on the surfaces of freshly printed sheets of paper minute wax particles to prevent offset of the printing when the sheets are superposed one upon the other in a pile,—the wax particles serving to establish an air gap between adjacent sheets. I make no claim to the application of waxy substances to paper for either of the above purposes, but what I do claim and desire to secure by Letters Patent is as follows:—

1. In the treatment of paper to reduce its surface friction, the improvement which consists in producing thereon minute flattened wax-like spots sufficiently separated from each other to avoid impairment of the adhesion between portions of said paper to which glue is applied.

2. In the conditioning of unprinted paper, preparatory to fabrication thereof into cups or like articles adapted to be nested, the improvement which consists in collecting on a surface of said paper a plurality of minute separate wax-like particles, and then flattening said particles to cause adhesion to said surface of a plurality of separate disk-like waxy spots, whereby the friction between the nested articles manufactured from said paper is materially reduced.

3. As a new article of manufacture, a sheet of paper adapted for fabrication into cups or like articles, said sheet having adhesively pressed into its surface a plurality of separate flattened minute waxy spots for the lubrication of said surface.

4. The herein described process of conditioning paper for manufacture into paper cups or the like, which consists in spraying a surface thereof with molten wax, to collect thereon a plurality of minute waxy particles, and thereafter flattening said particles on said surface into adherent separated disk-like spots for the lubrication of said surface.

5. The herein described conditioning process for paper, which consists in subjecting the same to surface spraying of molten wax, for the collection thereon of separate minute wax particles, and subjecting said particles to a flattening operation, whereby to produce on said surface a multiplicity of wax-like flattened lubricating spots.

6. The herein described process of conditioning paper for manufacture into cups and the like, which consists in first subjecting the same to a waterproofing impregnation, under the in-

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fluence of heat, then chilling the impregnated paper, then depositing on a surface thereof a multiplicity of separate minute wax-like particles, and finally, flattening said particles to cause adhesion to said surface of a multiplicity of small waxy lubricating spots.

7. In the conditioning of water-proofed paper, preparatory to fabrication thereof into cups or like articles adapted to be nested, the improvement which consists in first spraying said paper with molten wax, to gather thereon a multiplicity of minute wax particles, and then subjecting said particles, while on the paper, to heat and pressure, to flatten them into a multiplicity of adherent lubricating spots, thereby to reduce materially the surface friction between the nested articles manufactured from said paper.

8. As a new article of manufacture, a sheet of paper for the fabrication, with adhesive seams, of cups or like articles adapted to be nested, the surface of said sheet presenting a multiplicity of minute flattened spots of wax, to promote slippage between the nested articles fabricated therefrom, and said spots being sufficiently separated from each other to avoid impairment of the adhesion of the seamed portions of said articles.

9. In the conditioning of paper, for fabrica-

tion into receptacles with glued seams and adapted to nest in one another, the improvement which consists in first depositing on a surface of said paper a multiplicity of minute separate wax-like particles, and then flattening said particles into a plurality of adherent separated spots, thereby to reduce the surface friction between the nested receptacles manufactured from said paper while still leaving sufficient unwaxed areas between said spots to avoid impairment of the adhesion of the paper at said glued seams.

10. The herein described conditioning process for paper, which consists in initially depositing thereon minute particles of a relatively hard wax having a high boiling point, and then flattening said particles into a multiplicity of separated adherent lubricating spots.

11. The method of reducing the surface friction of paper or the like, which consists in spraying the same with molten Carnauba wax, and then, by pressure and heat, ironing out the solidified wax particles so deposited into a multiplicity of separated adherent lubricating spots.

12. Paper having its surface rendered slippery by a multiplicity of adherent separated flattened spots of Carnauba wax.

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