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PARCHMENT PAPER AND METHOD OF
MAKING SAMEJohn A. Newman, Edgeley, Pa., assignor to Pater-
son Parchment Paper Company, Bristol, Pa., a
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11 Claims. (Cl. 91-68)

The invention relates to the production of a web of parchmented vegetable fiber which is waterproof and resistant to dialysis, capable of retarding evaporation of moisture from articles wrapped therein and possessing a surface which will readily receive and retain printer's ink on either surface.

In the standard vegetable parchment paper on the market, the vegetable fibres of the paper web are converted by a chemical treatment to a gelatinous substance known as amyloid which dissolves as it were or envelops each individual fibre, completely filling the interstices and by a cementing action bonds the whole into a homogeneous mass. As the result of the process of parchmentizing the original paper undergoes such modification that it no longer softens or separates into its original fibres on being soaked or even boiled in water but retains its coherence, being impervious to water, and also retains its newly acquired properties when redried. The conversion is strictly chemical and the result is a product which is both odorless and tasteless and insoluble. These qualities render it particularly suitable for many commercial uses. Although the product is impervious to water, it readily absorbs moisture due to the hygroscopicity of the material. Accordingly, although ordinary parchment paper, due to its imperviousness to water, might seem to be an ideal material for purposes of wrapping articles of food or the like, it has not proven itself to be entirely satisfactory for such uses and it has therefore been a customary practice in preparing parchment paper for the purpose of serving as wrapping material for moisture-containing products, to place a surfacing coat of wax or paraffin upon the parchment paper. Due to the solid character of the parchment paper the wax appears as a coating only and is necessarily the product of a wet-wax process, it being impossible to dry-wax the ordinary parchment paper. A sheet of wet-waxed parchment paper, because of its waxed surface, does not readily take on printers' ink and the amount of wax required is necessarily relatively large.

It is the object of the present invention to produce a dry-waxed parchment paper which will not only be free from the objections of the wet-waxed parchment, but will also have special advantages of its own and be capable of preventing evaporation from and of conserving the moisture of moisture-containing products such as butter, soap, etc. when wrapped in such dry-waxed parchment.

Confronted with the generally accepted fact that vegetable parchment was supposed not to be capable of responding to a dry-wax process, I conceived the idea that if the parchmentizing treatment were not carried to the full extent used in making the standard paper, there might be a possibility of establishing in the paper a certain porosity sufficient to permit the paper to become subject to a dry-wax process and still retain the advantages of a parchmented surface. Experiments based on this idea resulted in the discovery that if in the parchmentizing process the period of exposure to the chemicals was shortened or the chemicals were somewhat weakened, or retarded in their action upon the interior fibres of the paper web, or a combination of any of these conditions were employed, a product would result which, while possessing a well parchmented surface, was sufficiently porous or absorbent to take up wax or paraffin in its interior structure between the outer parchmented surfaces in the interior fibres which had been at best but feebly parchmented, leaving the outer surfaces relatively free of wax.

This is accomplished by passing one surface of the porous parchmented web over a roll which applies fluid paraffin and then passing the web between heated drums under slight compression. The waxed paper is then wound on a roll and, being quite hot, the roll is permitted to stand for several hours and in the process of cooling in the tightly wound state the wax is apparently further driven into the fibrous portions of the web and away from the parchmented surfaces.

The outer surfaces of the thus dry-waxed parchment paper can be readily printed upon and such printing is not smudged or blurred by reason of the presence of the wax within the body of the paper. The thickness of the paper is not materially increased and due to the fact that there is thus created a continuous barrier or sheet of wax throughout the entire interior portions of the parchment, the moisture contained in articles wrapped in such paper will not be transmitted through the paper and whatever moisture is taken up by the parchmented portion of the paper on one surface thereof cannot readily pass through to the other because of the interposed barrier or dam of wax. The new dry-waxed product, to all appearances, is ordinary parchment paper. It does not possess the feel of waxed paper. The interior film of wax is so thin that a paper parchmented according to the new method which prior to the parchmented-

ing treatment weighs $27\frac{1}{2}$ pounds per 500 24" x 36" sheets, will take up only about three pounds of paraffin per ream. In making the new dry-waxed parchment paper the web may, after the completion of the parchmmentizing operation, be treated with a softener or plasticizer such as glycerine for rendering the sheets flexible and pliable and the presence of the glycerine does not interfere with the capacity of the interior unparchmmented or feebly parchmmented fibrous section of the product from absorbing the paraffin. The new product retains the essential characteristics of vegetable parchment and is useful for wrapping, for box linings, and it retards evaporation or escape of moisture as in the case of butter, soap, and other products, and prevents dialysis as is the case of butter containing salt and has many other advantages readily apparent to many classes of users.

A special advantageous feature of the new product is that it can readily be attached to other objects or to portions of itself by means of glue or other cementing material without any difficulty such as is experienced in attempting to glue together waxed paper or wet-waxed parchment. In view of the fact that no injurious ingredients are employed, the paper can be safely used in connection with food stuffs.

The process of manufacturing ordinary vegetable parchment involves the initial manufacture or use of a paper such as water leaf which contains no sizing and is very soft and absorbent, these qualities being essential for the success of the parchmmentizing or chemical step. The parchmmentizing or chemical process consists in subjecting the paper web to the action of chemicals such as sulphuric acid, phosphoric acid, zinc chloride, or other agents which will convert the fibres of the paper into a gelatinous substance. A customary strength of acid is about 55° Bé. (69.65% H_2SO_4 at 60° F.) to 56° Bé. (71.17% H_2SO_4 at 60° F.) but the range is, of course, subject to considerable fluctuation as to acid strength and temperature. A typical speed at which the paper is passed through the acid, for example, in the case of a paper weighing $27\frac{1}{2}$ pounds for 500 24" x 36" sheets, is about 350 feet per minute. As the thickness of the paper increases, the run is correspondingly slower. When the acid-treated paper leaves the acid bath, the adhering acid is washed off and the paper passes over drying drums and is then finished parchment paper.

A typical example of making the new paper involves a reduction in the strength of acid to for example 53° Bé. (65.49% H_2SO_4 at 60° F.) with or without an increase in the speed of the machine or maintaining the speed constant, reducing the amount of paper which passes through the bath per unit of time. In any event, the correlation of the factors referred to should be such as to produce a sheet of a porous nature in which a lightly parchmmented web is secured whose top and bottom surfaces are both lightly parchmmented while the interior consists of unparchmmented or but very feebly parchmmented fibres. Inasmuch as the pulp from which the paper is made varies somewhat and some paper is denser or more compressed than other paper of the same weight, the process will be subject to adjustment from time to time whenever the desired result is not obtained. These adjustments are very readily made, preferably by a control of the speed of the paper through the acid and/or the control of the

length of paper immersed at any moment in the acid bath. Controls such as these are well understood by those skilled in the art.

In the preferred process the control manipulations just referred to are the only ones employed, while the strength of the acid is allowed to remain the same as that used for making standard parchment paper because in that event the same acid can be used for all parchmmentizing operations used in the plant including the new process, and for all weights of paper.

Because of the light parchmmentation resulting from the new practice, a condition is set up in the product which makes it possible to drive something into a sheet which, if it had been subjected to the standard parchmmentation process, would be impermeable. As the lightly parchmmented web of the new process leaves the acid it is washed and passed over drying drums and is then drawn through melted paraffin or wax in a manner well understood by those familiar with the dry-wax process.

In the manufacture of the new product any highly absorbent unsized paper may be employed such as cotton paper or alpha cellulose paper.

In the new process the desired result may also be obtained with parchmmentizing agents other than sulphuric acid such for example as phosphoric acid, zinc chloride, or other chemicals effecting a similar conversion of vegetable fibres into a parchmmented product. It is also possible in connection with the new process to load the raw material with pigments, for example, titanium oxide, or opaque pigments, or sizing material for the purpose of retarding the parchmmentizing effect of the acids used with the result that acids of the standard or higher concentrations can be used to obtain the result aimed at.

The wax-filled parchment paper is also capable of being used to produce special effects by the application of heat and pressure. In case, for instance, the point of a hot metal instrument is drawn over the sheet under pressure, the path of the instrument remains visible on the sheet as a transparent track.

It is understood that the invention is not restricted to any particular or prescribed method or process of parchmmentizing and is not limited to any particular or specific form of wax or waxed material, but is directed broadly to the production of a dry-waxed parchmmented paper in which dry-waxing has been made possible by limiting the parchmmentizing effects of the chemicals used in the parchmmentizing treatment to a condition where the paper is still sufficiently porous to absorb wax-like substances in its interior fibrous structure and the web has not yet become so completely parchmmented as to be impervious to access by fluid waxy substances into its interior.

Furthermore, the impregnating substance need not necessarily be wax or paraffin but may be a substance such as rubber latex or medicated material or any other substance which is absorbable by the parchmmented web and is capable of remaining in the web up to the time of the use for which the impregnating substance is selected. For the purposes of my broader claims any such substances are to be regarded as the equivalents of wax or paraffin.

When it is stated in some of the claims that one or both surfaces of the paper are substantially free from wax, it is not intended to indi-

cate that no wax can be located on such surfaces. The phrase is employed to convey the thought that while there may be some small amounts of wax on the surfaces, wax is not present in such amounts as to impart a "waxy" feel to the paper, or to prevent the surfaces from being capable of receiving and retaining printer's ink, or to prevent ordinary glue from exerting a strong binding effect when used to join two sheets together.

I claim:

1. A vegetable parchment paper having relatively light parchmented exterior surfaces and a fibrous interior section substantially unparchmented, porous with respect to the entry into the interior thereof of extraneously applied wax, the fibrous interior section being impregnated with a wax, the finished product forming a dry-waxed parchmented paper at least one surface of which is capable of receiving and retaining printer's ink.

2. A vegetable parchment web having relatively lightly parchmented top and bottom surfaces and an interior fibrous structure substantially unparchmented, the latter only being impregnated with a congealed wax, and at least one of the surfaces being substantially free from wax.

3. A dry-waxed vegetable parchment paper characterized by having exterior surfaces relatively lightly parchmented and free from any noticeable wax coating and an interior section of relatively fibrous substantially unparchmented material impregnated with a wax, a part of said product being more transparent than any other parts and consisting of the said wax as recongealed from a supplemental locally applied heat under pressure.

4. A vegetable parchment web having relatively light parchmented top and bottom surfaces, an interior fibrous structure substantially unparchmented, and a plasticizer such as glycerin diffused throughout the web, the interior fibrous structure being impregnated with wax, at least one of the surfaces of the paper being substantially free from wax.

5. A vegetable parchment web having relatively light parchmented top and bottom surfaces, an interior fibrous structure substantially unparchmented, and a retarder of parchmentizing effects such as pigments or sizing described throughout the web, the interior fibrous structure being impregnated with a wax, at least one surface of the paper being substantially free from wax.

6. A vegetable parchment web having relatively lightly parchmented top and bottom surfaces and an interior fibrous structure substantially unparchmented, the latter being impregnated with paraffin, at least one of the surfaces of said web being free from paraffin.

7. The process of producing vegetable parchment paper which consists in passing a porous paper web through an acid bath to cause parchmentation of the exterior surfaces of the web, removing the acid and drying, and in the parchmentation limiting the extent of parchmentation so that the same shall effect an active parchmentation of the surface por-

tions of the web but shall not proceed beyond the stage where the web, when subsequently washed and dried, is no longer sufficiently porous to absorb in its interior wax or paraffin applied by a dry-wax process, and impregnating the interior structure of said web with a wax by a dry-waxing process.

8. A method of making dry-waxed paraffin paper which comprises passing a porous paper web through an acid bath, regulating the effect of the said action on the web to limit the treatment to a light parchmentation, leaving the web porous and its interior still fibrous and substantially unparchmented, removing the acid, drying, subjecting the dry porous web to a dry-wax process, impregnating the interior fibrous structure of the web with wax and leaving the outer parchmented surfaces of the web relatively uncoated, and causing the impregnated wax to congeal in the web.

9. The method of making dry-waxed paraffin paper which comprises passing a porous paper web through an acid bath, regulating the effect of the said action on the web to limit the treatment to a light parchmentation leaving the web porous and its interior still fibrous and substantially unparchmented, removing the acid, drying, bringing the dried web into contact with a wax by a dry-wax process to impregnate the fibrous interior of the web while leaving the surfaces of the webs substantially free and uncoated, subjecting the resultant product to simultaneously applied heat and pressure, rolling up the thus treated web while still hot into rolls and causing dissipation of the heat from the hot web while in the rolled-up condition.

10. The method of making dry-waxed paraffin paper which comprises passing a porous paper web through an acid bath, regulating the effect of the said action on the web to limit the treatment to a light parchmentation, leaving the web porous and its interior still fibrous and substantially unparchmented, removing the acid, drying, bringing one surface of the dried web into contact with molten wax by a dry-wax process, subjecting the waxed web to simultaneously applied heat and pressure, rolling up the thus treated web while still hot into rolls and causing dissipation of the heat from the hot web while in the rolled-up condition, whereby the interior structure is impregnated with the wax and the surfaces are substantially unaffected.

11. The method of making dry-waxed paraffin paper which comprises passing a porous paper web through an acid bath, regulating the effect of the said action on the web to limit the treatment of a light parchmentation, leaving the web porous and its interior still fibrous and substantially unparchmented, removing the acid, drying, subjecting the dried porous web to a dry-wax process to impregnate the interior fibrous structure of the web with wax and leaving the outer parchmented surfaces of the web relatively uncoated, causing the wax to congeal in the web and locally applying heat under pressure to create patterns of greater transparency at the localities where said heat and pressure are applied.

JOHN A. NEWMAN.