

UNITED STATES PATENT OFFICE.

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METHOD OF PREPARING PARAFFIN OR WAXED PAPER.

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To all whom it may concern:

Be it known that I, CHARLES IGNATIUS GOESSMANN, a citizen of the United States of America, and a resident of Worcester, in the county of Worcester and State of Massachusetts, have invented new and useful Improvements in Paraffin or Waxed Paper and Methods of Preparing the Same, of which the following is a specification.

My invention relates more particularly to paper and the method or process of treating the same either during the process of manufacture or after the same has been manufactured, although my process or method may also be employed with some fabrics other than paper.

My invention also relates to the strengthening of paraffin or waxed paper or other fabrics and to the rendering of the same impervious to water or moisture.

The object of my invention is to produce a paraffin or waxed paper or other fabric which will be stronger than when subjected to any paraffin or waxing treatment heretofore known.

My object is to further provide a process or method and means by which said objects or results may be attained, and, further, to provide methods or processes by which said results may be expeditiously and economically attained.

My invention consists in the methods, means, steps, or processes by which I attain the objects of my invention, both singly and collectively.

In carrying out my invention any convenient machinery or apparatus may be employed and any unctuous matter comprising animal, vegetable, or mineral fat suitable for the purpose may be used, although paraffin or wax is generally preferred.

As this invention has more particular reference to paper and treatment of the same and only general reference to other fabrics, I herein set forth in detail the best methods and processes of carrying out my invention as applied to paper fabrics.

The treatment may be applied in part while the pulp is being formed into paper or the

finished paper may be treated. If the material is to be treated while being formed into paper, then the better method is to begin treatment when the web of pulpy material leaves the Fourdrinier wire or the cylinders, it then being in a damp condition, but with the larger percentage of the moisture removed. From this point the treatment of the fabric is the same, whether it be pulp in a sheet, as above stated, or finished paper.

The treatment consists, first, in immersing the material in a bath of glutinous material, preferably animal glue, and by preference the bath of glutinous material should be hot to effect the more rapid absorption and more perfect permeation and deposit of the glutinous material in and throughout all the microscopic interstices of the fabric being treated. By preference a suitable tank is provided in which the glutinous material is deposited and in which it may be kept heated to a constant temperature, about 80° centigrade, the fabric being passed through the solution. I prefer that the material being treated be kept in motion or passed continuously through the bath in a continuous sheet. This saves time, and I find that the requisite permeating of glutinous matter or incorporation of glutinous matter and fiber will with some papers—for instance, manila or wood tissues—require but two seconds' immersion. As the fabric passes from the glutinous material the surplus of such material is removed, preferably by compression. The strength and consistency of the glutinous bath may be varied, depending upon the material being treated and the uses for which it is designed. It may, however, be stated that in a majority of cases a hot solution of about one part of animal glue to about fifteen parts of water, by weight, gives the best results. After leaving the bath of glutinous material the fabric is passed into and through a solution of formaldehyde and water. The strength of this formaldehyde solution may also be variable, dependent, as heretofore stated, upon the fabric and uses for which it is designed. In the majority of cases, however, a solution of one part of formaldehyde to five parts of water,

by weight, gives the best results, and the best result is attained if this bath is maintained at a temperature of about 15° centigrade, though any particular temperature is not essentially necessary to give good results. The temperatures, however, herein pointed out facilitate the rapidity of treatment. The effect of the formaldehyde solution upon the glutin-saturated fabric is to precipitate the glutinous matter and render it insoluble. As the material comes from the formaldehyde-bath by preference the surplus solution adhering to the surface is removed by rolls or other convenient means. The fabric is then dried in any convenient manner. The best result is attained by the air-blast method of drying—*i. e.*, projecting blasts of air against both surfaces of the fabric, hot-air blasts being preferred as most rapid and effective. The drying removes all the watery constituents and leaves the fabric in a toughened and much strengthened but hard and brittle condition. To temper and render the fabric soft and pliable, I subject it to moisture, which penetrates the fabric, causing a swelling in all directions, partially filling all the interstices, producing both mechanical and chemical change. The mechanical action is the temporary absorption of water analogous to the absorption of water by a dry sponge, and the chemical action is the permanent union or combination of water with the treated fabric, analogous to the combination of water and tapioca, causing swelling, or like the chemical combination of water with lime or cement. For this purpose I prefer to pass the fabric into a bath of hot water, saturated steam, or equivalent heat and moisture medium, thus causing the fibers and the non-soluble glutinous material filling the interstices to expand in all directions, thus forcing the glutinous material into all the microscopic pores or openings and into the masses of fiber, causing a commingling of the fibers and glutinous compound, and at the same time a chemical change—"hydration"—takes place, whereby the hardened mass of fiber, gluten, and formaldehyde becomes tempered and softened, increasing the strength imparted by the previous treatment. The paper material is next dried again. The paper material is at this point in proper condition to receive a treatment of melted paraffin or melted wax, or a mixture of both. Although at this point the paper material is strengthened greatly and the pores substantially filled, it still has a sufficient porosity to admit of an absorption of wax, paraffin, or oily matter. To heighten the tempering and softening effect, I in some instances introduce glycerin in the tempering-bath, and in most cases one-half of one per cent., in volume, of glycerin gives the best result, thus giving a softer paper, after which the fabric is dried in any convenient manner and is in condition for treatment with melted paraffin or melted wax or a mixture of melted paraffin and wax or oily matter. This may be

brought about by leading the tempered paper material after drying into the melted paraffin or wax or oily matter, passing it through the bath, resulting in thorough impregnation, and as the paper material emerges from this bath removing the excess of melted paraffin or wax matter and drying in any convenient manner, preferably by blasts of cool air. This treatment results in a paper material that is suitable for wrapping and protecting such sticky and gummy materials as candies and all kinds of confectionery and sugared fruits, &c.

For the purpose of rendering the material absolutely free from all traces of acidity and all taste and odors and, in fact, to render it absolutely hygienic, I subject it before passing it to the paraffin or wax treatment and preferably before drying to a bath of water and a volatile alkali—ammonium hydrate—the proportion by preference in a majority of cases being one per cent. of ammonium hydrate to ninety-nine per cent. of water, by volume. This bath is preferably cool; but a variation in its temperature will not to a serious extent interfere with its operation. To hasten the drying, I may introduce alcohol in this bath. The effect of the bath followed by drying is to complete the chemical reaction and destroy all taste or odor, removing all traces of acids, and rendering the fabric hygienic in all respects. The material being dried in any convenient manner may now be paraffined in the same manner as heretofore indicated. With my methods or processes the sheet of material or paper, for instance, can be treated as rapidly as it is manufactured, as the time for exposure to the action of the several baths need not exceed eighteen seconds, and the length of time of exposure to the action of any separate bath may be fixed by making the tank of such length that the requisite time will elapse while the sheet is passing through it, and the guides can be arranged so as to maintain the sheet in such solution the requisite length of time.

By the term "hydration" as herein employed I mean subjecting the glutinous-treated fabric to moisture in any manner and to such an extent as to cause the formaldehyde-treated glutinous material to undergo the change herein described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The improvement in the art of manufacturing a fabric, consisting in saturating the untreated fabric with glutinous material, then subjecting the fabric to the action of formaldehyde, then drying, then subjecting to moisture and drying again, and then treating with unctuous matter as paraffin or wax.

2. The improvement in the art of manufacturing a waterproof fabric, consisting in saturating the untreated fabric with glutinous material, then subjecting the fabric to the action of formaldehyde, then drying, then subjecting to moisture, then subjecting to the ac-

tion of a volatile-alkali solution, then drying, and then treating with unctuous matter as paraffin or wax.

3. The improvement in the art of manufacturing waterproof fabric, consisting in saturating with a solution of glutinous material, then submitting to the action of formaldehyde, then drying, then subjecting to moisture and glycerin, then drying, and then treating with unctuous matter as paraffin or wax.

4. The improvement in the art of manufacturing waterproof fabric, consisting in first applying a solution of glue, then subjecting the material thus treated to the action of a solution of formaldehyde and drying, then applying moisture and glycerin in a heated state, then drying, and then paraffining or waxing.

5. The improvement in the art of manufacturing a waterproof fabric, consisting in first applying to the untreated fabric a solution of glue, then subjecting the material thus treated to the action of formaldehyde, then drying, then applying moisture and glycerin in a heated state, then a solution of ammonium hydrate, then drying, and then paraffining or waxing.

6. The improvement in the art of manufacturing waterproof fabric, consisting in sub-

jecting a moving sheet of fabric, first, to the action of a glutinous solution; second, to the action of formaldehyde; third, drying; fourth, to the action of hot water or saturated steam; fifth, drying, and sixth, to the action of melted paraffin or wax.

7. The improvement in the art of manufacturing waterproof fabric, consisting in subjecting a moving sheet of fabric, first, to the action of a glutinous solution; second, to the action of formaldehyde; third, drying; fourth, to the action of hot water or saturated steam; fifth, to the action of a volatile-alkali solution; sixth, drying, and seventh, to the action of melted paraffin or wax.

8. The improvement in the art of manufacturing waterproof fabric, consisting in subjecting a moving sheet of fabric, first, to the action of a glutinous solution; second, to the action of formaldehyde; third, drying; fourth, to the action of hot water or saturated steam and glycerin; fifth, to the action of a volatile-alkali solution; sixth, drying; and seventh, to the action of melted paraffin or wax.

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Witnesses:

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