May 14, 1935. G. R. ALDEN 2,001,049

GUMMED PAPER AND METHOD OF PREPARING

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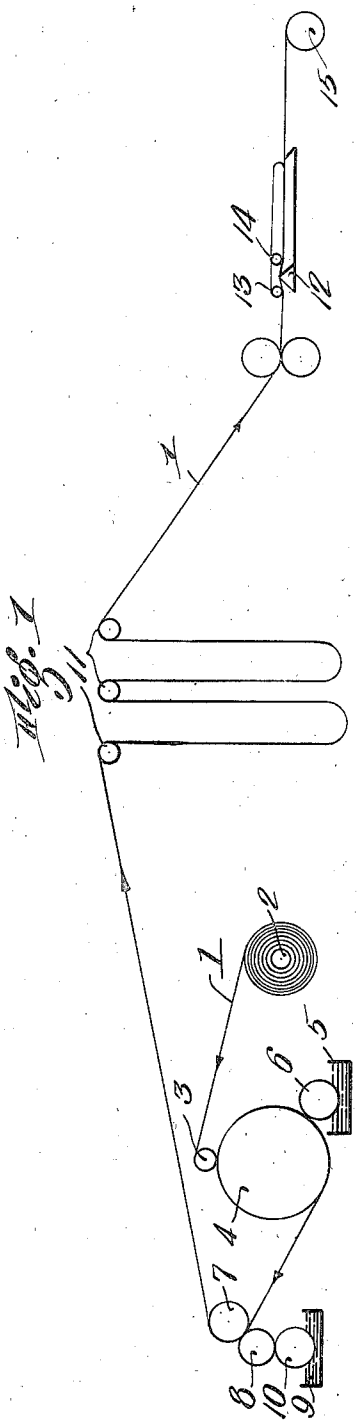


Fig. 1

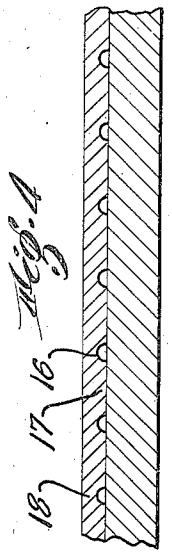


Fig. 4

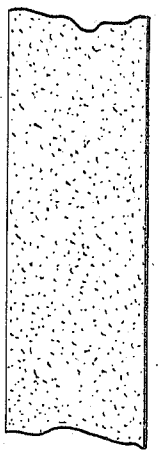


Fig. 3

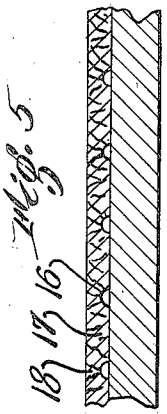


Fig. 5

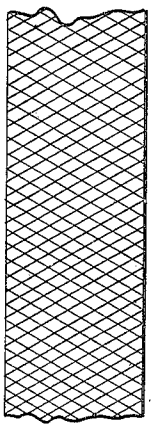


Fig. 2

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GUMMED PAPER AND METHOD OF PREPARING

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15 Claims. (Cl. 91—68)

This invention relates to gummed paper, and to a method of preparing the same, especially to prevent curling.

In the usual manufacture of gummed papers, it is customary to coat a sheet of paper with fluid compositions such as dextrine, animal glue, fish glue, or the like. This penetrates the fibrous surface of the paper sheet and also forms a superficial continuous layer of adhesive. Upon drying, this surface coating becomes relatively hard and brittle, and shrinks appreciably. Such shrinkage of the outer adhesive layer may be greatly in excess of any shrinkage of the paper, even though the latter is initially very wet. The intermediate layer of impregnated fibres firmly holds the adhesive and paper layers together, but may shrink somewhat less on account of the intervening mass of fibres embedded in the adhesive matrix. The paper sheet, being usually somewhat moistened by the fluid composition, shrinks slightly upon drying, but not enough to compensate for the shrinkage of the adhesive and hence yields to the shrinkage stresses of the drying adhesive layer and the sheet as a whole tends to curl toward the glue side.

The difficulties thus introduced in the preparation and subsequent use of gum coated papers are obvious, and numerous expedients have been adapted to overcome them. Of these, one of the most commonly employed is that of "breaking" the paper by drawing it, under considerable tension over a sharp edge. This tends to crack the impregnated surface of the paper sheet as well as the outermost layer of hardened gum or glue. But owing to the intermediate, glue impregnated layer of fibre at the surface of the paper sheet, it requires a considerable tension upon the sheet to thus bend the paper sharply enough adequately to break up the structure of the adhesive layer and of the glue impregnated layer of fibre. Such excessive tension frequently causes complete rupture or tearing of the sheet, with attendant waste of material, time and labor in again threading and starting the sheet through the breaking apparatus.

It is therefore an object of this invention to prepare a sheet of gummed paper in which the gum coating may be more uniformly and more effectively 'broken", so as to overcome the tendency of the same to curl. It is also an object to provide a discontinuous superficial layer of the adhesive. It is a further object to insure the adhesion of the gum coating to the paper sheet, both prior to and after its application and use. Other objects will appear from the following disclosure.

In accordance with the present invention, a sheet of paper or like flexible material is treated with a resistant material such as wax, (as by printing or spraying the same in a suitable condition, either as a fused liquid or as a solution or emulsion), in the form of a finely divided, open pattern or stippling of discrete particles, or a reticulated pattern of fibriform lines; and applying over the same a substantially continuous layer of the fluid gum or adhesive composition. The thus treated sheet may then be allowed to dry and harden. It is then preferably subjected to the usual breaking operation in any usual and convenient manner. In so doing, it is found that a relatively light tension or strain across the breaking bar is sufficient to shatter the outer continuous layer of adhesive with innumerable fine lines or fissures, without loosening it from the sheet, without causing wrinkles or creases therein, and at the same time minimizing the liability of tearing.

It will be understood that the advantages of the invention may also be realized in part by applying to the otherwise untreated sheet an open pattern, (reticulated or stippled) of the adhesive, with or without subjecting to a subsequent breaking operation. In a further modification of the invention, the sheet may be provided with a substantially continuous layer of the resist or wax like material and then (by suitably modifying the adhesive as hereinafter described) applying a continuous or discontinuous layer of the adhesive thereto, followed by the breaking operation. In such modification however the wax like material ceases to act as a resist and adheres to the superposed adhesive layer. But the procedure described above is preferred where the paper is intrinsically absorbent of moisture and where a continuous adhesive film or surface is desired.

A typical instance of carrying out the invention will be described with reference to the accompanying drawing, in which:

Fig. 1 is a side elevation of suitable apparatus for preparing and breaking the gummed sheet;

Fig. 2 is a plan view of the sheet as prepared with the resist, showing a reticulated pattern;

Fig. 3 is a plan view of a sheet, as prepared with resist, showing a dispersed or stippled pattern;

Fig. 4 is an enlarged cross-section of the finished sheet, before breaking; and

Fig. 5 is a cross-section of the finished sheet after breaking.

Referring to the drawing, a sheet of paper 1 may be drawn from roll 2 and passed over guide roll 3 which directs and holds it firmly against a printing drum 4. While on the drum 4 the sheet may be printed with a resist from tank 5, by means of an intaglio printing roll 6, which dips therein. The composition of a suitable resist may be prepared as follows: 45 lbs. of an emulsion of 40% vegetable tallow (tallow treated with sulphuric acid and then neutralized), contained in water as a vehicle, is agitated while approximately 3 lbs. 10 ounces of wheat starch is gradually added and the mixture heated to 180° F. until the latter is thoroughly dispersed or dissolved. The approximate proportions of this mixture would then be—tallow 28 parts, starch 2 parts and water 70 parts. Other solutions or emulsions such as Carnauba wax, paraffin wax, japan wax, etc., may be suitably employed.

As thus printed, the sheet 1 carries a reticulated fine-lined pattern (or a discontinuous stippled pattern) as shown in Fig. 2 (Fig. 3) but preferably one in which the area actually covered by the resist may be smaller than the uncovered portion and which, at the same time, divides the latter up into individually small areas.

Upon leaving the roll 4 the sheet is passed between rollers 7, 8, the lower of which receives a uniform layer of glue or other adhesive from tank 9 by means of applicator roll 10. The sheet may then pass over rollers 11, in festoons, to dry or through other drying apparatus of usual types. The dried sheet may then be taken up on rewinder (not shown) if desired. However, it may also be passed directly over a "breaker" such as the knife edge 12 mounted (preferably at an angle to the sheet) between, and offset with respect to two guide rollers 13, 14, and then taken up upon a rewinder 15, in finished condition. A second knife edge (set at substantially right angles to the first) may also be used.

The coated sheet, before "breaking", comprises the sheet of paper 1, (see Fig. 4) carrying spaced deposits of resist 16, which may stand in low or high relief upon the surface of the sheet to form a reticulated pattern of lines or a dispersion of dots, and an intervening deposit of the adhesive or glue 17 which fills in between the pattern of resist and may bridge over the same as at 18, to form a continuous layer. In the areas between the resist, the adhesive is firmly adherent to the paper sheet and may penetrate appreciably between the superficial fibres of the same. But such penetration does not form a continuous stiff intermediate fibre reinforced layer, as heretofore. On the contrary, such areas are both small in extent and separated from each other by the intervening deposits of the resist which present relatively flexible areas of unstiffened paper, and gives the discontinuity necessary for non-curling. (With some resists, such areas may be rendered softer and more flexible than the untreated paper).

Conversely, when a stippled pattern of resist is employed, a reticulated pattern of adhesive is formed therebetween.

Hence, in either case, the paper between the areas of adhesive is relatively free to flex. Moreover, since the resist and adhesive do not become rigidly attached to each other, free flexing therebetween is feasible. Consequently, when the sheet passes over the breaker knife edge 12, the hardened glue deposits fracture without separating from the adjacent deposits of resist, and the continuous layer of adhesive above the resist, being of less cross-sectional dimension than the other portions, fractures more freely than a continuous deposit of uniform thickness. Accordingly, an infinite number of fissures or fine cracks 20 is produced throughout the adhesive so that there is no accumulation of stresses in the adhesive layer and the adhesive coated sheet does not tend to curl up but is relatively flexible and will lie flat.

As a modification of the invention above described, the resist may, as already indicated, comprise a discontinuous pattern, such as a stippling of fine dots, spaced apart from each other, thus leaving continuous spaces therebetween for the reception of the adhesive coating. In either case the adhesive may or may not cover the resist, according to the specific amounts required for the purposes which the gummed paper is to serve.

In the event that the adhesive is intended to cover the resist in appreciable areas, or to be applied to a continuous layer of resist as above mentioned, so that it must in large part or entirely adhere to the free surface of the resist, it is desirable to adapt the latter accordingly. It is found that this may be done by increasing the proportion of wheat starch relative to the tallow in the resist composition. For example, the following composition may be thus employed:

	Parts
Vegetable tallow	¼ to 3
Wheat starch	12
Water	87.75 to 85

the ingredients being mixed cold and heated to 180° F. for a few minutes. Other adhesives may be used instead of wheat starch, such as gum arabic, dextrine, etc., and the amounts varied in accordance with the degree of viscosity, etc., required.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. Method of preparing gummed paper, comprising applying to a sheet of paper a finely divided open pattern of resist and thereafter applying to the paper a continuous layer of adhesive and subjecting the coated sheet to breaking.

2. Method of preparing gummed paper, comprising as steps applying a resist to a sheet of paper in a finely divided open pattern, and coating the same with a fluid adhesive, drying, and thereafter breaking the adhesive coating.

3. A sheet of gummed paper, comprising a finely divided open pattern of a resist, and a superposed substantially continuous coating of an adhesive, each in intimate association with the paper sheet.

4. A sheet of gummed paper, comprising a finely divided stippled pattern of a resist, and a superposed coating of an adhesive, each in intimate association with the paper sheet.

5. A sheet of gummed paper, comprising a finely divided reticulated pattern of a resist, and a superposed complementary coating of an adhesive, each in intimate association with the paper sheet.

6. A sheet of gummed paper, comprising a finely divided dispersed pattern of a resist, and a superposed coating of an adhesive, each in intimate association with the paper sheet, said adhesive coating being traversed by a network of fine fissures.

7. The method of preparing gum paper which comprises applying to one side of a sheet of paper a resist, thereafter applying on the same side a coating of liquid adhesive which is brittle when dry, drying the adhesive to the point of brittleness, and then breaking the brittle coating, said resist serving to facilitate the breaking operation.

8. The method of preparing gum paper which comprises applying to one side of a sheet of paper a resist comprising starch, thereafter applying on the same side a coating of liquid adhesive which is brittle when dry, drying the adhesive to the point of brittleness, and then breaking the brittle coating, said resist serving to facilitate the breaking operation.

9. The method of preparing gum paper which comprises applying to one side of a sheet of paper a resist comprising tallow, thereafter applying on the same side a coating of liquid adhesive which is brittle when dry, drying the adhesive to the point of brittleness, and then breaking the brittle coating, said resist serving to facilitate the breaking operation.

10. The method of preparing gum paper which comprises applying to one side of a sheet of paper a resist comprising tallow, thereafter applying on the same side a coating of liquid adhesive which is brittle when dry, drying the adhesive to the point of brittleness, and then breaking the brittle coating, said resist serving to facilitate the breaking operation.

11. The method of preparing gum paper which comprises applying to one side of a sheet of paper a resist composed of starch, tallow and water, thereafter applying on the same side a coating of liquid adhesive which is brittle when dry, drying the adhesive to the point of brittleness, and then breaking the brittle coating, said resist serving to facilitate the breaking operation.

12. The method of preparing gum paper which comprises applying to one side of a sheet of paper a resist approximately one-eighth starch and a few per cent tallow, thereafter applying on the same side a coating of liquid adhesive which is brittle when dry, drying the adhesive to the point of brittleness, and then breaking the brittle coating, said resist serving to facilitate the breaking operation.

13. The method of preparing gum paper which comprises applying to one side of a sheet of paper a resist approximately one-fourth tallow and a few per cent starch, thereafter applying on the same side a coating of liquid adhesive which is brittle when dry, drying the adhesive to the point of brittleness, and then breaking the brittle coating, said resist serving to facilitate the breaking operation.

14. The method of preparing gum paper which comprises applying to one side of a sheet of paper a resist in a finely divided open pattern, thereafter applying on the same side a coating of liquid adhesive which is brittle when dry, drying the adhesive to the point of brittleness, and then breaking the brittle coating, said resist serving to facilitate the breaking operation.

15. The method of preparing gum paper which comprises applying to one side of a sheet of paper a resist in a finely divided reticulated pattern, thereafter applying on the same side a coating of liquid adhesive which is brittle when dry, drying the adhesive to the point of brittleness, and then breaking the brittle coating, said resist serving to facilitate the breaking operation.

GARDNER R. ALDEN.