F. W. KENT.

PHOTOGRAPHIC PRINTING PAPER AND TRANSFER PROCESS.

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1,228,680. Patented June 5, 1917.

Fig. 1.

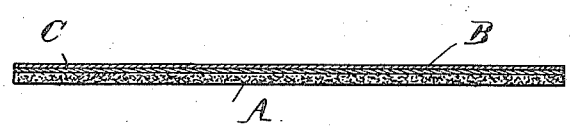
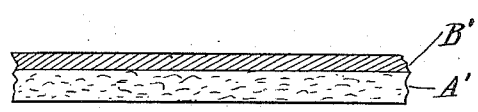


Fig. 2.



Witnesses

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PHOTOGRAPHIC PRINTING PAPER AND TRANSFER PROCESS.

1,228,680. Specification of Letters Patent. Patented June 5, 1917.

Application filed December 13, 1913. Serial No. 806,445.

To all whom it may concern:

Be it known that I, FRANK WILLIAM KENT, of 72 Manor street, Clapham, London, England, gentleman, a subject of His Majesty the King of England, have invented certain new and useful Improvements in and Relating to Photographic Printing Paper and Transfer Processes, of which the following is a specification.

This invention is for improvements in and relating to photographic printing paper and transfer processes.

As a basis upon which the original protograph or positive is produced, or any one of the original photographs or positives when several are to be associated or combined, use is made of paper or the like fully saturated with or impregnated with wax, paraffin wax being a desirable quality. The saturation with wax insures easy separation of the base after the transfer is made, also non-expansion in aqueous fluids, whereby accuracy of fit and register results. The saturation with wax, as distinguished from mere surfacing or partial saturation with wax or the like, prevents a temporary locking up of fluid which takes place in partly saturated paper; such locking up of chemicals rendering satisfactory washing and working difficult, and by the admixture of chemicals, rendering certain toning operations impracticable. It is found that a desirable saturation is attained by immersing the material in the melted wax until air bubbles cease to escape and squeezing or brushing off all excess. After this and when cold the wax surface may be brush polished.

The surface of the paper or the like, saturated with wax may be burnished by friction against a smooth and hard edge or surface or it may be polished by friction with a brush or soft pad; thus being realized the technical effect of a sheet or slab of wax, smooth on one surface, held together by a mass of fiber, and such that warmth makes it uniformly soft and flexible throughout its whole thickness.

On the waxed base any suitable sensitive photographic preparation is spread; and especially suitable combination in this respect being the waxed base coated with a gelatin emulsion containing pyroxylin such as is known as Vogel's emulsion, the so-called Vogel's composite or collodio-gelatin emulsion consisting essentially of gelatin emulsion and pyroxylin emulsion both dissolved in acetic acid. It may be characterized as a sensitive gelatin-pyroxylin emulsion in acetic acid. Such an emulsion flows on and adheres to the waxed base but other emulsons and sensitive preparations may involve the use of a medium or substratum on the waxed basis and under the sensitive layer, in order to realize the essential condition of even flow and adhesion. A substratum suited for this purpose is the insensitive basis of the above-mentioned Vogel's emulsion (or gelatin and pyroxylin dissolved in acetic or other closely allied fatty acid alone or with alcohol) when laid or coated upon the waxed base forms a generally desirable substratum when the sensitive layer is a gelatin emulsion in water or in water with a modicum of alcohol. This substratum is also suitable when the sensitive layer is a collodion emulsion. A suitable formula for a substratum mixture of the kind indicated above is the following: —

Soluble pyroxylin	10 grams
Gelatin	10 "
Glacial acetic acid	280 "

When a thin substratum is required the above may be diluted with once or twice its volume of glacial acetic acid, of alcohol, or of a mixture of acetic acid and alcohol, but very wide variation is allowable. As alternatives the pyroxylin alone or the gelatin alone in acetic acid may be used, or these two solutions may be used in succession. Acetic acid or acetic acid in admixture with alcohol has the special double advantage of softening paraffin wax without dissolving any appreciable proportion and without carrying the paraffin wax into the substratum.

In Figure 1 of the drawing appended hereto, A designates a base consisting of paper fully saturated with wax, B a substratum which allows of the easy coating of the waxed paper with emulsion or like, and C a sensitive layer or emulsion in which the image is formed, this image being then transferred to a new support. In Fig. 2 of the drawing appended hereto A′ designates a base consisting of paper fully saturated with wax, and B′ the sensitive layer of

gelatin-pyroxylin emulsion in which a picture is formed by exposure, development and fixation.

The sensitive layer may be of any ordinary character and the photograph whether positive or negative or for transformation from one to the other may be produced by camera exposure, printing out, or development in any usual or known manner. Ordinarily a gelatin-haloid emulsion forms a desirable sensitive layer, the image being when wished toned or treated to any desired tint or condition.

An image having been formed or produced on a basis of waxed paper or the like as described above, the photographic film or surface is cemented or transferred to the permanent support by means of a suitable cement and more especially a resinous or resinoid or equivalent cement. A generally preferred mode of performing this operation is to cover both the receiving surface and the photographic film with a solution of india rubber in benzol, and when the solvent has evaporated, the surfaces are pressed together; the rubber being sufficiently adhesive. The transfer basis of waxed paper or the like is now peeled off, its separation being aided, if necessary, by the application of warmth or of a solvent which dissolves or softens the wax; benzol for example.

Warmth or heat thus applied may function doubly, first by facilitating the separation of the transfer basis, and secondly by so far softening the rubber or resinoid substance as to insure a fuller degree of adhesion than would otherwise be realized. When the transfer basis has been removed without heat, with heat, or by the aid of a solvent, heat may be applied to the transferred film in order to further promote its adhesion. This application of heat may be made by using a gentle pressure with a warm roller or a laundry iron, it being expedient to interpose a protective medium such as paper with the double aim of protecting the transferred film and absorbing any trace of wax which may remain.

The mode of effecting the transfer may be varied by only coating one surface with india rubber or resinoid substance, for example the receiving surface preferably or alternatively the photographic film.

A highly important function of the india rubber as a cementing material in effecting the transfer is its yielding quality or elasticity, whereby separation of a flexible base and film is prevented; such separation being often due to the minute shift of the base and film in relation to each other in bending. The india rubber as used in carrying out the present invention may be replaced wholly or in part by other resinoid substances having the characteristic of yieldingness and elasticity, as for example gutta percha, balata, gutta jettong, gutta grek, gutta horfoot, or gutta lumbut. Substances of the class known as rubber substitutes or artificial rubbers may be used provided that there is a sufficient degree of solubility.

Rubber or an equivalent as defined above may be used on one of the surfaces to be conjoined and a somewhat harder resinous or resinoid body on the other surface as for example dammar, or the like; these by the application of warmth as already described becoming united and conjointly giving the desirable degree of yieldingness and of elasticity. Mixed rubber and dammar in benzol forms a convenient adhesive for transfer, the strength being for example 2 grams of well masticated rubber and 2 grams of dammar to a 30 cubic centimeter of benzol. If when dry this or other resinoid stratum is not sufficiently adhesive it may be softened on the surface by exposure to the fumes of benzol or like fluid. As an alternative the dammar or equivalent cement may be used alone as described.

The transfer having been effected, as already described to the receiving surface; *e. g.*, of wood, textile, enamel, celluloid, or paper; and if desirable over or upon any existing sketch or design, another transfer may be superimposed, the outer surface of the first transfer having been treated or prepared as described, in order that the second transfer may adhere. In a similar manner any required number of transfers may be superimposed.

As the transfer basis of waxed paper or the like is never absolutely clear or transparent, and for particular purposes may be opaque, black or nonactinic, it is frequently desirable to make a mechanical or visual provision for securing register or correspondence; this being of especial importance in putting one transfer over another, when the transfers are color elements in the process of composite heliochromy.

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. Process for transferring photographs which consists in completely saturating with wax a sheet of paper so that it becomes wholly non-absorbent of aqueous fluids and repellent of aqueous emulsion, coating the paper with gelatin and pyroxylin dissolved in acetic acid, and over this coating with a sensitive stratum, forming a picture by exposure, development and fixation, transferring the picture to an adhesive surface, and stripping off the wax saturated sheet.

2. Process for transferring photographs which consists in completely saturating with wax a sheet of paper so that it becomes wholly non-absorbent of aqueous fluids and repellent of aqueous emulsion, coating the paper with gelatin and pyroxylin dissolved

in acetic acid and alcohol, and over this coating with a sensitive stratum, forming a picture by exposure, development and fixation, transferring the picture to an adhesive surface, and stripping off the wax saturated sheet.

3. Photographic paper for printing and subsequent transfer consisting of a base of wax saturated paper carrying a substratum consisting of gelatin and pyroxylin, and over this carrying a sensitive stratum.

4. Photographic printing and transfer paper consisting of a base of wax saturated paper carrying a stratum consisting of collodio-gelatin emulsion.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK WILLIAM KENT.

Witnesses:
HENRY CONRAD HEIDE,
ALBERT G. BARNES.