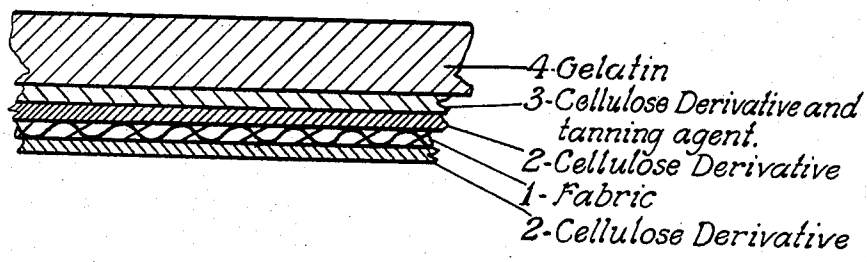
June 29, 1937. R. L. LESTER 2,085,197

DUPLICATOR PAD

Filed July 5, 1935



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Patented June 29, 1937

2,085,197

UNITED STATES PATENT OFFICE

2,085,197

DUPLICATOR PAD

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Application July 5, 1935, Serial No. 29,929

15 Claims. (Cl. 41—31.6)

This invention relates to duplicator sheets or rolls and the method of manufacture, and more particularly to the manufacture of gelatin coated duplicator sheets or rolls.

Duplicator pads or rolls are commonly used in preparing copies of a suitably prepared original. The matter to be copied is written, drawn, typed or printed with a specially prepared copying ink on paper and the paper is then placed with the face upon which the writing, etc., has been made on a gelatin composition coated pad or roll and slight pressure applied with either the hand or a roller. In this manner the special ink on the original is transferred to the gelatin composition after which the sheet is removed from the duplicator pad or roll. An imprint of the original matter on the paper is left on the pad. Copies of this are then prepared by pressing blank sheets of paper against the face of the pad and applying slight pressure by means of which the written, printed or typed matter is imparted to the sheet and a copy thus made.

As indicated above the duplicator pads or rolls are usually made by applying a suitable gelatin composition to a suitable base, usually a square weave fabric. In order to improve the strength and life of the base to which the gelatin composition is applied cellulose derivative coated fabrics have been used. However, difficulty has been encountered in securing a firm adhesion between the gelatin composition and the cellulose derivative coated base material. The gelatin composition is usually applied while in a liquid state and on cooling gels to form a uniform film.

This invention has as an object the provision of a method for manufacturing improved duplicator sheets or pads whose base is a cellulose derivative coated fabric.

Another object is the provision of a method for making duplicator pads or rolls having satisfactory adhesion between the cellulose derivative film on the base and the gelatin composition film.

A still further object is the provision of a method for making duplicator pads or rolls which contain a gelatin composition film on a suitable cellulose derivative base which material possesses improved quality and life in service.

These objects are accomplished by the application of a suitable composition to the film of the cellulose derivative coated base to which the gelatin composition is applied, which intermediate composition produces a satisfactory adhesion between the cellulose derivative film on the base and the gelatin composition. This intermediate coating is of such a nature as to be securely bonded to the cellulose derivative film as well as to the gelatin composition film which is subsequently applied.

In the attached drawing the single figure is a section of a duplicator pad made according to the present invention, wherein

1 represents the base fabric, 2 is a coating of a cellulose derivative composition such as #1 below, 3 is an intermediate cellulose derivative composition containing a tanning agent, and 4 represents the usual duplicator gelatin composition. The drawing is obviously diagrammatic and is not intended to be drawn to scale.

The following example of a preferred embodiment is given by way of illustration but not by way of limitation except as defined in the appended claims.

A suitable fabric base such as a sheeting weighing approximately 4.8 ounces per linear yard 43" wide and having a yarn count of warp 60 and filler 56 is coated with a cellulose derivative composition of the following formulation:

Composition #1

	Per cent by weight
Cellulose nitrate	13.02
Ethyl acetate	16.45
Ethyl alcohol	24.69
Pigment	15.26
Castor oil	30.58

This composition is applied in a plurality of coatings by means well known to those skilled in the art of coating fabrics. The base material is preferably coated on both sides. This coated material after being suitably dried is then treated on the face which is to receive the gelatin duplicating composition with one or more coats of a composition having the following formulation:

Composition #2

	Per cent by weight
Cellulose nitrate	10.45
Potassium alum	18.18
Ethyl acetate	28.55
Alcohol	42.82

These coatings are dried according to well known procedures such as passing the material over heated steam coils or through a suitably heated closed chamber. The gelatin composition which will vary in its formulation, depending on particular results desired, is then superimposed on the film resulting from the application of Composition No. 2. This gelatin composition may be of any suitable formulation and in itself does not

constitute a part of this invention. The usual ingredients are gelatin, a hygroscopic agent such as glycerine, and water. Other materials such as soap or agents to render the colloid irreversible may be added. The proportions are often varied to suit conditions of temperature and humidity. This is well understood in the art. The finished material will be found to possess excellent adhesion between the cellulose derivative film on the base material and the gelatin composition film.

Composition No. 2 noted above is preferably prepared in the following manner:

	Percent by weight
Potassium alum	27.28
Cellulose nitrate	2.48
Ethyl acetate	28.10
Alcohol	42.14

The above ingredients are mixed together and then ground in a suitable ball mill for from 8 to 10 hours.

Another composition comprising:

	Percent by weight
Cellulose nitrate	24.07
Ethyl acetate	30.37
Ethyl alcohol	45.56

is then prepared according to any of the procedures which are well known for dispersing cellulose derivatives.

The completed Composition No. 2 is then prepared by mixing two parts of the alum composition described above and one part of the cellulose derivative dispersion in suitable mixing equipment for approximately 30 minutes. The composition is now ready to be applied to the fabric on the cellulose derivative film having the formulation as described under Composition No. 1.

As indicated above the gelatin duplicator composition may be applied to the treated cellulose derivative film immediately after such treatment, or it may be applied at any later time without impairing in any way the satisfactory adhesion secured between the gelatin composition film and the cellulose derivative film on the base material. If practical needs dictate so, the material may be stored for more or less indefinite periods of time before being used for making the duplicator sheets or rolls.

In the example the fabric base is noted as being coated on both sides. While this embodiment is preferred if desired the cellulose derivative coating may be applied only to one side of the base. In place of the woven fabric other base materials of a felted nature such as paper and similar products may be used as will be indicated to those skilled in the art of preparing such materials.

The cellulose derivative composition illustrated under Composition No. 1 may be varied within wide limits to suit particular needs, such variations being well known in the art. Further other cellulose derivatives than the nitrate as for example, the acetate and other esters as well as ethers may be used.

In Composition No. 2 potassium alum is noted as the preferred so-called tanning agent. Other alums as, for example, ammonium alum, chrome alum, burnt alum, etc., may be used with equally satisfactory results. Further ferric salts such as ferric chloride have also been found to be satisfactory as well as potassium dichromate, aluminum sulphate, ammonium sulphate and chromic chloride. Among organic compounds which have been found satisfactory are phenol, resorcinol, hydroquinone, pyrogallic acid, formaldehyde, tannic acid, etc. For the sake of convenience these compounds are referred to as tanning agents in the claims, however, it is to be understood that the term also covers obvious equivalents of those listed and which have the effect of rendering gelatine insoluble, that is, those which may be used to prepare an irreversible colloidal suspension of the gelatin.

It has been found that the so-called tanning agents such as alum and similar materials dispersed in a mixture of ethyl acetate and alcohol may be applied directly to the cellulose derivative coated surface if desired with satisfactory results as to suitable anchorage between the cellulose derivative film and the subsequently applied gelatin composition film. However, the most satisfactory results are obtained if cellulose nitrate is present and a composition such as Composition No. 2 is used since the cellulose nitrate imparts a desirable consistency to the dispersion obviating settling of the dispersed material on storage, provides a medium for applying the so-called tanning agent uniformly over the surface and further acts as a binding agent to prevent the later removal of the tanning agent by abrasion. It is thus apparent that the quantity of the tanning agent may vary over wide limits; for example, if the total solids of Composition No. 2 is represented by 100 the tanning constituent is found to be effective between the limits of 100 and 10 so that the cellulose nitrate may vary between 0 and 90 parts. Variations in the concentration of the solids of the composition as exemplified by Composition No. 2 may be made to suit particular needs such needs and adaptations being readily apparent to those skilled in the art. The cellulose nitrate used in Composition No. 2 may vary with regard to viscosity but a material having the viscosity of approximately 15 seconds has been found to yield the most satisfactory results. The viscosity as here represented is determined by noting the time of fall through a 10'' column of a quarter inch steel ball at 25 deg. C., the cellulose nitrate dispersion being 12.35% in a dispersing medium consisting of ethyl acetate 40% and ethyl alcohol 60% by weight.

The product of the invention finds special adaptation for use in the manufacture of duplicator sheets and rolls which are made by applying a suitable gelatin composition to a cellulose derivative coated base material.

The principal advantage of the invention is the provision of a method for obtaining satisfactory adhesion between cellulose derivative base coated material and a subsequently applied gelatin composition used in the manufacture of duplicator sheets and rolls. The product produced is improved as to initial quality and also service life.

A further advantage of the invention is the provision of a method whereby suitable anchorage may be obtained between the gelatin composition film and the cellulose derivative coated base material on which the gelatin composition is applied subsequent to the manufacture of the coated material without any special treatment before the application of such gelatin composition film.

A still further advantage is the retention of the original flexibility of the material in service and the practical elimination of the greasing of the back of the copy pads in packing to prevent

the sticking of the gelatin surfaces to each other.

I claim:

1. Process for making duplicator sheets which comprises applying to at least one side of a suitable flexible base material at least one coat of a cellulose-derivative composition, applying to the cellulose derivative film thus deposited a cellulose derivative composition comprising a tanning agent, and superimposing thereon a layer of a gelatin composition.

2. Process for making duplicator sheets which comprises applying to at least one side of a suitable fabric base material a plurality of coats of a cellulose derivative composition, applying to the cellulose derivative film thus deposited a cellulose derivative composition comprising a tanning agent, and superimposing thereon a layer of a gelatin composition.

3. Process for making duplicator sheets comprising applying to at least one side of a suitable base material a plurality of coats of a cellulose derivative composition comprising cellulose nitrate, pigment and a softener, applying to the cellulose derivative film thus deposited a cellulose derivative composition comprising a tanning agent, and superimposing thereon a layer of a gelatin composition.

4. Process for making duplicator sheets comprising applying to at least one side of a suitable base material a plurality of coats of a cellulose derivative composition, applying to the cellulose derivative composition thus deposited a composition comprising cellulose nitrate and potassium alum, and superimposing thereon a layer of a gelatin duplicating composition.

5. Process for making duplicator sheets comprising applying to at least one side of a suitable fabric base a plurality of coats of a cellulose derivative composition comprising cellulose nitrate, pigment and softener, applying to the cellulose derivative film thus deposited a composition comprising cellulose nitrate and potassium alum, superimposing thereon a layer of gelatin duplicating composition.

6. Process of claim 1 in which the tanning agent is selected from the group consisting of ammonium alum, chrome alum, burnt alum, ferric chloride, potassium dichromate, aluminum sulphate, ammonium sulphate and chromic chloride.

7. Process of claim 1 in which the tanning agent is selected from the group consisting of phenol, resorcinol, hydroquinone, pyrogallic acid, formaldehyde and tannic acid.

8. A duplicator pad comprising a fabric base, a cellulose derivative composition coated thereon and a gelatin composition adhesively joined to the cellulose derivative coating, the cellulose derivative coating and the gelatin composition being joined in the manner obtainable by treating the cellulose derivative coating with a tanning agent dispersed in a solvent for the cellulose derivative coating composition and thereafter pouring molten gelatin on the resultant.

9. A duplicator pad comprising a cloth base coated on at least one side with a cellulose derivative-softener composition, an intermediate cellulose derivative composition coat containing a tanning agent, and a final gelatin duplicating layer joined at one surface to the intermediate composition.

10. Product of claim 9 in which the tanning agent is potassium alum.

11. A flexible sheet material comprising a flexible base material with a cellulose derivative layer thereon, and a bonding agent comprising a cellulose derivative and a dispersion of a tanning agent which has been dried on the surface of the cellulose derivative layer, said bonding agent surface possessing the property of adhering to the surface of gelatin compositions.

12. A flexible duplicator sheet material comprising a flexible base material with a cellulose derivative layer thereon, a bonding agent comprising a dispersion of a tanning agent and cellulose nitrate which has been dried on the surface of the cellulose derivative layer, and a relatively thick gelatin duplicating composition joined at one surface to said bonding agent.

13. A process for making duplicator sheets which comprises applying to at least one side of a cloth base material a plurality of coats of a cellulose derivative composition comprising essentially cellulose nitrate, ethyl acetate, ethyl alcohol, pigment and castor oil, drying the material, applying to the cellulose nitrate composition thus deposited a bonding composition comprising essentially cellulose nitrate having a viscosity of about 15 seconds, potassium alum, ethyl acetate and ethyl alcohol, drying said bonding composition and superimposing thereon a gelatin duplicating composition.

14. A flexible sheet material comprising a flexible base material having coated thereon a cellulose derivative composition, said cellulose derivative composition having incorporated in its outer surface a tanning agent.

15. A method of preparing duplicator sheets which comprises coating a sheet weighing approximately 4.8 ounces per linear yard of forty-three inch width and having yarn count of warp 60 and filler 56 with a composition comprising

	Per cent by weight
Cellulose nitrate	13.02
Ethyl acetate	16.45
Ethyl alcohol	24.69
Pigment	15.26
Castor oil	30.58

drying the resulting coated fabric, treating coated surface of the coated fabric with a composition comprising

	Per cent by weight
Cellulose nitrate	10.45
Potassium alum	18.18
Ethyl acetate	28.55
Alcohol	42.82

which has been prepared by mixing together

	Per cent by weight
Potassium alum	27.28
Cellulose nitrate	2.48
Ethyl acetate	28.10
Alcohol	42.14

in a ball mill for 8 to 10 hours and mixing two parts of the same with one part of a composition comprising

	Per cent by weight
Cellulose nitrate	24.07
Ethyl acetate	30.37
Ethyl alcohol	45.56

for approximately thirty minutes and thereafter applying a layer of gelatin to the coated surface containing the alum.

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