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TRANSFER COPYING MATERIALS

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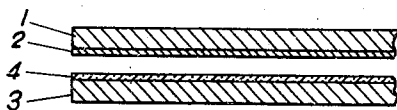


FIG. 1

FIG. 2

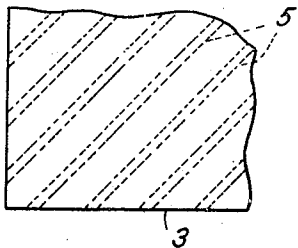


FIG. 3

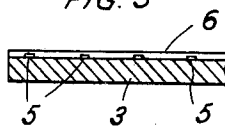


FIG. 4

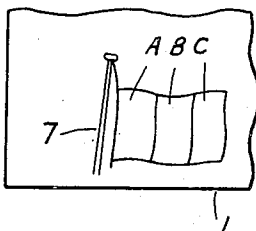


FIG. 5

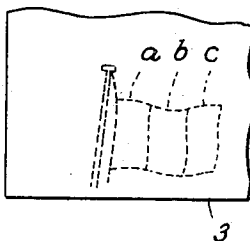


FIG. 6

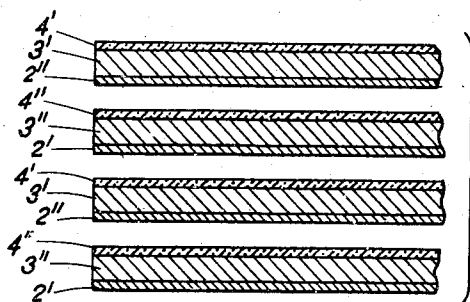
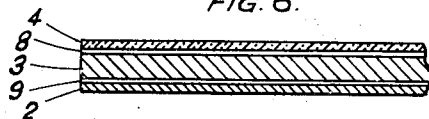
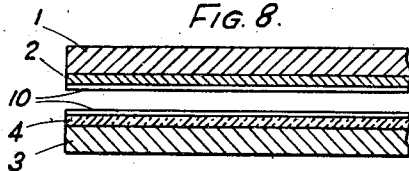


FIG. 7

FIG. 8



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TRANSFER COPYING MATERIALS

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19 Claims. (Cl. 282—28)

This invention relates to transfer copying materials of the kind in which one or more copies of writing produced on an original sheet, for example by handwriting or typewriting, are reproduced on a copy sheet or copy sheets placed beneath the original sheet. Normally such copies are made by the transference of colouring matter from a transfer coating carried either on the backs of the original or copy sheets which are to transfer copies to an adjacent sheet or on separate interleaved sheets.

It is an object of the present invention to provide transfer copying materials, which operate without the transference of colouring matter, and in such manner that the colouring matter of which the copied writing is composed is not visible on the unused materials and only becomes visible after copying where the writing impression occurs.

According to the invention, a set of transfer copying materials comprises one or more copy sheets carrying a dyestuff or like colouring matter in an undissolved and dispersed condition, and one or more transfer sheets carrying a transfer coating comprising a transferable material capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

The colouring matter, for example a fat or alcohol soluble dyestuff or dye base, such as a Typogen dyestuff, may be applied to the copy sheet in undissolved and dispersed condition in any desired manner, and it will be understood that the quantity so applied will not be sufficient to impart any strong coloration to the sheet so that an adequate colour contrast is produced by the action of the substance which brings the colouring matter into the dissolved condition. It may, however, be desirable to mask wholly or partially the colour of the dispersed colouring matter by the addition of a suitable pigment to cover or counteract the colour. In this way the treated surface of the copy sheet may be given a colour substantially the same as the untreated surface. Thus, when applying the colouring matter to a white paper sheet a white pigment, such as titanium white, may be used to mask the colouring matter. Instead of mixing the masking pigment with the colouring matter it may be applied as a separate layer over the colouring matter. The dispersed colouring matter may also be incorporated in the paper pulp during the manufacture of the sheet, and in this

case the colouring matter will be masked to a considerable extent by the cellulosic fibres if no masking pigment is used.

As the substance which brings the colouring matter into the dissolved condition there is used a solvent for the colouring matter, if desired in conjunction with an agent which assists the dissolution of the colouring matter or converts the latter into a soluble form. There may be used, for example, a dyestuff which is soluble in an organic medium, such as a fatty, oily or waxy substance, used as the solvent in the transfer coating. For this purpose the so-called fat or oil soluble dyestuffs are suitable, in conjunction with organic media in which they are soluble, for example, relatively non-volatile alcohols or ethers thereof, waxes, fatty acids, esters of phthalic acid, phosphoric acid or other organic or inorganic acids, and other relatively non-volatile organic solvents. Among the alcohols there may be mentioned fatty alcohols, for example, cetyl alcohol or oleyl alcohol ("Ocenol"), or mixtures of fatty alcohols, such as Lanette wax; polyhydric alcohols, for example, ethylene glycol; and benzyl alcohol. Suitable fatty acids are, for example, oleic acid, ricinoleic acid, nut oil fatty acid, palm nut oil fatty acid, stearic acid, palmitic acid, montanic acid, lauric acid and capric acid. As esters of organic or inorganic acids there may be mentioned butyl laurate, ethyl oleate, butyl ricinoleate, butyl stearate, diamyl tartrate, dibutyl tartrate, methyl glycol phthalate, benzyl butyl phthalate, dibutyl phthalate, sextol phthalate, triphenyl phosphate, tricresyl phosphate and triacetin. It has been found that organic acids, for example, fatty acids, resinic acids or aromatic acids, such as benzoic acid or toluic acid, assist the dissolution of the dyestuffs, more especially basic dyestuffs. The functions of solvent and solution assistant may be combined in a single substance, and for this purpose oleic acid, or ricinoleic acid may be used. Furthermore, a wax or waxy substance used in making the transfer coating may act as the solvent, and waxes containing free organic acids, for example, montan wax, are especially suitable as they combine the functions of solvent and solution assistant. It is, however, generally preferable to employ a solvent of higher solvent power in addition to the wax, especially when such a solvent has a plasticising action on a wax which might otherwise be too hard to effect a satisfactory transfer. - In the case of solvents, such as ethylene glycol, which are not miscible with waxes they may be emulsified with the wax, and then,

if necessary, a plasticiser may be added to soften the wax.

The invention is not confined to the use of an organic solvent medium, and is also applicable to aqueous media as solvents. For this purpose a water-soluble dyestuff may be applied to the copy sheet in an undissolved and dispersed condition, and the transfer coating may contain an aqueous medium emulsified or dissolved therein. As an aqueous medium a hygroscopic substance, such as glycerin, containing water may be used, which medium is emulsified or dissolved in the wax or other transferable material of the transfer coating by means of an emulsifying agent. The higher alcohols are suitable for emulsifying glycerin in waxes. Alternatively, a mixture of glycerine and starch grains may be dispersed in a wax in the manner described in United States specification No. 2,168,098 dated August 1, 1939, for preparing a transfer coating. Instead of a water-soluble dye-stuff there may be used a water-insoluble dyestuff, in which case the transfer coating will contain in addition to the aqueous medium a wetting agent, such as a sulphonated fatty acid or alcohol or a wax soap, which assists the dissolution of the dyestuff or converts it into a water-soluble form. For this purpose sulpho-ricinoleic acid may be used in conjunction with S. R. A. dyestuffs.

The known waxy or other transfer compositions used for preparing carbon or like transfer materials, but without the dyestuff or pigment, are suitable for application to the transfer sheet used in this invention, provided that such compositions have adequate solvent properties with respect to the colouring matter used in the copy sheet, or provided that suitable solvents or solution assistants are incorporated therewith. The composition may be applied hot or cold in known manner uniformly or in patches to the surface of the transfer sheet. If the oily or fatty substances customarily used in transfer compositions for softening or plasticising the wax have insufficient solvent action, there may be used instead a liquid or semi-liquid, relatively non-volatile solvent appropriate to the dyestuff used. For example, with the insoluble Induline Blue base as dyestuff a plasticiser, such as methyl glycol phthalate tricresyl phosphate or butyl phthalate, may be used as solvent. It is also advantageous to incorporate a filler, such as a white pigment or starch, in the transfer composition to reduce the tendency of the solvent to bleed on the copy sheet, and so to obtain greater sharpness in the copy. Other ingredients may be incorporated in the transfer composition, for example, a fixative for basic dyestuffs, such as calcium stearate, and agents to counteract rancidity, such as phenol or para-hydroxy-benzoic acid.

The colouring matter may be coated on the copy sheet by applying thereto a dispersion of the colouring matter in a non-solvent liquid medium, advantageously an aqueous medium, containing a binding agent. Suitable binding agents are casein, dewaxed shellac (which in either case may be dissolved in a weak aqueous solution of borax), or dextrin. It is also of advantage to add a binding when the dispersed colouring matter is incorporated in the paper pulp, as this leads to a better fixation of the colouring matter.

The dispersion of the undissolved colouring matter may be applied locally in the form of a coating by a printing process. In this case there may be used a vehicle of the kind used for

fugitive printing inks and consisting of a glycerine solution of dextrin or gum in the usual proportions, or a vehicle consisting of a mixture of paraffin oil and ester gum. The dispersion prepared with either of these vehicles may contain about 3-6 per cent of an appropriate dyestuff and about 10-15 per cent of a masking pigment, for example, titanium white.

Various forms of copying materials made in accordance with the invention are shown by way of example in the accompanying drawing in which:

Figure 1 shows in cross section on an enlarged scale a pair of transfer and copy sheets,

Figs. 2 and 3 show in plan and cross section, respectively, a special form of copy sheet,

Figs. 4 and 5 show in plan view a set of children's tracing papers,

Fig. 6 shows in cross section a copy sheet having a transfer coating on its lower surface,

Fig. 7 shows in cross section a set of two kinds of copy sheets having transfer coatings on their lower surfaces, and

Fig. 8 shows in cross section a pair of transfer and copy sheets provided with protective films.

The transfer sheets may be prepared as original sheets 1 on which the writing is to be performed, and with the transfer coating 2 applied to the back uniformly or in patches at selected places, as in the case of the known back carbonised stationary. Alternatively, the transfer sheets may be made of suitably thin material for use as separate interleaved transfer sheets.

A single colouring matter 4 or mixture of colouring matters giving an appropriate mixed colour may be applied uniformly or in patches to the copy sheet 3. Colouring matters, or mixtures of colouring matters, giving different colours may be applied to different areas of the copy sheets, where it is desired that separate data should be recorded in distinct colours. It is also possible as shown in Figs. 2 and 3 to overprint areas 5 producing one colour on the copy sheet 3 locally, for example in patches or lines, with a composition producing a different colour. This may be done when the copy sheets take the form of cheques on which the copied writing will appear in two colors. As shown in Figs. 4 and 5, children's tracing papers may be made by printing drawings, for example, a flag as shown in Fig. 4, on the upper surface of the transfer sheets 1, and applying appropriate colour producing compositions to the areas a, b and c of the copy sheet which lie beneath the parts A, B and C of the drawing which are to be reproduced in different colours.

When it is desired to produce several copies simultaneously the copy sheets 3 may have the transfer coating 2 applied to their lower surfaces as shown in Fig. 6. In order to reduce the risk of the solvent in the transfer coating penetrating through the paper and acting on the colouring matter on the upper surface, it is advisable to apply a layer of, or impregnate the paper with, a suitable solvent repelling substance before applying the transfer coating or the colouring matter. Casein is a suitable substance for repelling a fatty or oily solvent. Such a layer may be applied at 8 or 9 or at both 8 and 9 as shown in Fig. 6. The risk of solvent penetration may also be circumvented as shown in Fig. 7 by applying to the upper surface of the copy sheet 3' a colouring matter 4' which is insoluble in the solvent used in the transfer coating 2 on the lower surface. The upper surface

of the next lower copy sheet 3'' will then contain a colouring matter 4'' soluble in the solvent contained in the superposed transfer coating 2'', but insoluble in the solvent contained in the transfer coating 2' on its lower surface. Thus, two kinds of copy sheets 3' and 3'' will be required, for example, one kind carrying on its upper surface a fat-soluble dyestuff which is not soluble in polyhydric alcohols and on its lower surface a transfer coating containing a polyhydric alcohol as solvent, and on the other kind carrying on its upper surface a dyestuff which is soluble in polyhydric alcohols but not fat-soluble and on its lower surface a transfer coating containing a fatty solvent. For this purpose there is advantageously used as solvent ethylene glycol emulsified in a waxy transfer medium, and Nigrosine (alcohol soluble) may be used as the polyhydric alcohol-soluble dyestuff. These two kinds of sheets are arranged in alternation with their transfer coatings downward as shown in Fig. 7.

In order to reduce the risk of premature interaction between the transfer surfaces and the colour producing surfaces due to rubbing or slight pressure when the sheets are in contact, there may be applied, as shown in Fig. 8, over the transfer coating 2 and/or over the color producing surface 4 a thin protective film 10, for example of paraffin wax or casein, in the form of a continuous coating or a coating of fine particles which can be penetrated during copying. The penetrable protective film 10 is one which, under the pressure of the writing instrument, can be broken through as in the case of a continuous coating of paraffin wax, or can be permeated as in the case of a coating of particles of wax or casein or of a continuous coating of casein.

The transfer coating may also have incorporated therewith substances which are transferred together with the solvent and serve to prevent or detect forgery in the copy as described in British Patent No. 503,695, dated February 3, 1938.

The following examples illustrate the invention, the parts being by weight:

Example 1

The coating composition for the copy sheet is prepared as follows:

8 parts of casein are stirred with 100 parts of water containing 8 parts of a concentrated solution of ammonia until the casein is dissolved, and then the ammonia is allowed to evaporate. To the casein solution are added 60 parts of titanium white, 4 parts of Induline Blue base and 10 parts of Nubian Black (marketed by Messrs. Williams (Hounslow) Ltd.). The whole is stirred until the colour of the dyestuffs has disappeared. The resulting suspension is applied to the paper, while keeping the suspension well agitated.

The transfer sheet is prepared as follows:

28 parts of prime yellow carnauba wax, 7 parts of Lanette wax (a mixture of cetyl and octadecyl alcohols) and 17 parts of methyl glycol phthalate are melted together over steam and thoroughly mixed. The resulting transfer composition may be applied as a uniform coating or printed locally on the paper while hot, the paper being chilled immediately after the application of the coating in the manner known when applying waxy transfer compositions.

Instead of the coating composition described above, there may be used a composition prepared

as follows: 0.5 part of borax is dissolved in 60 parts of water, and 3 parts of casein are dissolved in the borax solution. The resulting solution is ground with 3 parts of Nubian Black, 2 parts of Induline Base A and 10 parts of titanium white.

Example 2

The copy sheet is the same as that described in Example 1, and the transfer sheet is prepared as follows: 30 parts of bleached montan wax, 21 parts of tricresyl phosphate and 6 parts of benzoic acid are thoroughly mixed together while heating as described in Example 1.

The resulting composition is applied to the paper as described in that example.

Example 3

A copy sheet is made by coating the paper in the manner described in Example 1 with a composition prepared as follows: 0.5 part of borax is dissolved in 60 parts of water, and 3 parts of casein are dissolved in the borax solution. 10 parts of Methyl Violet Base 10B are mixed with 30 parts of molten ester gum, and the solidified mixture is pulverized. 6 parts of the powdered mixture and 15 parts of titanium white are ground with the casein-borax solution described above.

The copy sheet coated with the above composition gives a bluish violet coloration with any of the transfer compositions of Examples 1 and 2, 9-11 and 13.

The following are examples in which the colouring matter is incorporated in the pulp used for making the copy sheet:

Example 4

2.5 parts of Nubian Black are ground with 10 parts of titanium dioxide in water. The resulting mixture is incorporated in a beater with 100 parts of sulphite cellulose pulp, to which size and alum have previously been added. The paper prepared with this pulp gives a blue-black coloration when used in conjunction with any of the transfer compositions described in Examples 9-13.

Example 5

10 parts of Methyl Violet Base 10B are mixed with 30 parts of molten ester gum, and the solidified mixture is pulverised. 6 parts of the powdered mixture are ground in water with 5 parts of titanium dioxide and 5 parts of clay. The resulting mixture is incorporated with 100 parts of pulp as described in Example 4. The paper prepared therewith gives a bluish violet coloration with any of the transfer compositions of Examples 9-11 and 13.

Example 6

2 parts of Oil Brown (dye powder) and 3 parts of the powdered mixture of Methyl Violet Base 10B and ester gum described in Example 5 are ground with 5 parts of titanium dioxide and 5 parts of clay. The resulting mixture is incorporated with 100 parts of pulp as described in Example 4. The paper obtained therewith gives a brown coloration with any of the transfer compositions of Examples 9-13.

Example 7

40 parts of Induline Base A are mixed with 25 parts of molten ester gum, and the solidified mixture is pulverised. 6 parts of the powdered mixture are ground in water with 10 parts of tita-

nium while. The resulting mixture is incorporated with 100 parts of pulp as described in Example 4. The paper obtained therewith gives a blue coloration with any of the transfer compositions of Examples 9-11 and 13.

Example 8

5 parts of the fat-soluble green dyestuff obtained as described in Example 4 of British Patent No. 525,042 dated February 17, 1938, are ground in water with 5 parts of titanium white and 5 parts of clay. The resulting mixture is incorporated with 100 parts of pulp as described in Example 4. The paper obtained therewith gives a green coloration with the transfer composition of Example 12.

In order to improve the fixation of the dyestuff in the pulp the mixture of dyestuff and pigment, instead of being ground in water, may in each of Examples 4-8 be ground in a solution of 6 parts of casein and 1 part of borax in 50 parts of water.

The following are examples of suitable transfer compositions. In each case the ingredients are mixed together by melting over steam; and the composition is applied to the paper in the manner described in Example 1.

Example 9

	Parts
Prime yellow carnauba wax	80
Brofo wax Y/554 (a hard wax marketed by Messrs. Brown and Forth Ltd., as a substitute for montan wax)	50
Russian tallow	30
Butyl stearate	45
Pale olein (oleic acid)	10
Brown SO olein (oleic acid)	5
Tricresyl phosphate	20
Ocerol (oleyl alcohol)	15
Petroleum jelly	5
Phenol	1
Calcium stearate	5
Para-hydroxy-benzoic acid	1

Example 10

	Parts
Prime Yellow carnauba wax	30
Brofo wax Y/554	30
Distilled white nut oil fatty acid	30
Butyl stearate	15
Butyl ricinoleate	15

Example 11

	Parts
Carnauba wax	30
Brofo wax Y/554	20
Beeswax	10
Distilled white nut oil fatty acid	70

Example 12

	Parts
Prime Yellow carnauba wax	30
Cetyl alcohol	60
Butyl ricinoleate	30

The composition of this example is suitable for use only in conjunction with fat-soluble dyestuffs, and not dyestuff bases.

Example 13

	Parts
White montan wax	70
Distilled nut oil fatty acid	30
Tricresyl phosphate	10
Butyl stearate	10
Butyl ricinoleate	20

I claim:

1. A set of transfer copying materials comprising at least one copy sheet carrying a coloring matter in an undissolved and dispersed condition, and at least one transfer sheet carrying a transfer coating comprising a transferable material capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

2. A set of transfer copying materials as claimed in claim 1, wherein the transferable material comprises a solvent for the coloring matter carried by the copy sheet.

3. A set of transfer copying materials as claimed in claim 1, wherein the transferable material comprises a solvent and a solution assistant for the coloring matter carried by the copy sheet.

4. A set of transfer copying materials comprising at least one copy sheet carrying a coloring matter in an undissolved and dispersed condition and a pigment which at least partially masks the color of the dispersed coloring matter, and at least one transfer sheet carrying a transfer coating comprising a transferable material capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

5. A set of transfer copying materials as claimed in claim 4, wherein the transferable material comprises a solvent for the coloring matter carried by the copy sheet.

6. A set of transfer copying materials comprising at least one copy sheet having a coloring matter dispersed in undissolved condition within the pulp of which the sheet is composed, and at least one transfer sheet carrying a transfer coating comprising a transferable material capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

7. A set of transfer copying materials comprising at least one copy sheet having incorporated within the pulp of which the sheet is composed a coloring matter in undissolved and dispersed condition and a pigment which at least partially masks the color of the dispersed coloring matter, and at least one transfer sheet carrying a transfer coating comprising a transferable material capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

8. A set of transfer copying materials comprising at least one copy sheet carrying a coating of a coloring matter in undissolved and dispersed condition and a binding agent for the coloring matter, and at least one transfer sheet carrying a transfer coating comprising a transferable material capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

9. A set of transfer copying materials comprising at least one copy sheet carrying a coloring matter in an undissolved and dispersed condition, and at least one transfer sheet carrying a coating of a waxy transferable material comprising a solvent capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

10. A set of transfer copying materials as claimed in claim 9, wherein the waxy transferable material comprises, in addition to the solvent, a solution assistant for the coloring matter carried by the copy sheet.

11. A set of transfer copying materials comprising at least one copy sheet carrying a coloring matter in an undissolved and dispersed condition, and at least one transfer sheet carrying a coating of a transferable material comprising a relatively non-volatile solvent consisting of an alcohol, which solvent is capable when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

12. A set of transfer copying materials comprising at least one copy sheet carrying a coloring matter in an undissolved and dispersed condition and a thin protective film over the coloring matter which can be penetrated during copying, and at least one transfer sheet carrying a transfer coating comprising a transferable material capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

13. A set of transfer copying materials comprising at least one copy sheet carrying a coloring matter in an undissolved and dispersed condition, and at least one transfer sheet carrying a transfer coating comprising a transferable material capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter, the said transfer coating having thereon a thin protective film which can be penetrated during copying.

14. A set of transfer copying materials comprising at least one copy sheet carrying a basic dyestuff in undissolved and dispersed condition, and at least one transfer sheet carrying a transferable material comprising a solvent for the basic dyestuff and an organic acid which assists the dissolution of the basic dyestuff, which solvent and acid, are capable, when transferred to the copy sheet under the writing impression, of bringing the basic dyestuff into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed basic dyestuff.

15. A set of transfer copying materials comprising a plurality of sheets each carrying on one surface thereof a coloring matter in an un-

dissolved and dispersed condition, and on the other surface thereof a transfer coating comprising a transferable material capable, when transferred to the surface of another of the sheets carrying the said coloring matter, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the sheet carrying the undissolved and dispersed coloring matter.

16. A set of transfer copying materials comprising a plurality of sheets each carrying on one surface thereof a coloring matter in an undissolved and dispersed condition, and on the other surface thereof a transfer coating comprising a solvent capable, when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter, and each of the said sheets having interposed between the coloring matter and the transfer coating a material which prevents the solvent from coming into contact with the coloring matter.

17. A set of transfer copying materials comprising at least one sheet carrying on one surface thereof a coloring matter in an undissolved and dispersed condition and on the other surface thereof a transfer coating comprising a solvent incapable of dissolving the said coloring matter, and at least one other sheet carrying on one surface thereof in an undissolved and dispersed condition a coloring matter soluble in the solvent carried by the first mentioned sheet and carrying on the other surface thereof a transfer coating comprising a solvent incapable of dissolving the coloring matter on the opposite surface but capable of dissolving the coloring matter carried by the first mentioned sheet, each of which solvents is capable, when transferred to the surface of a sheet carrying coloring matter soluble therein, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the sheet carrying the undissolved and dispersed dyestuff.

18. A set of transfer copying materials comprising at least one copy sheet carrying a coloring matter in an undissolved and dispersed condition, and at least one transfer sheet carrying a coating of a transferable material comprising a relatively non-volatile solvent consisting of a wax, which solvent is capable when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

19. A set of transfer copying materials comprising at least one copy sheet carrying a coloring matter in an undissolved and dispersed condition, and at least one transfer sheet carrying a coating of a transferable material comprising a relatively non-volatile solvent consisting of a fatty acid, which solvent is capable when transferred to the copy sheet under the writing impression, of bringing the coloring matter into a dissolved condition exhibiting a coloration which contrasts with the surface of the copy sheet carrying the undissolved and dispersed coloring matter.

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